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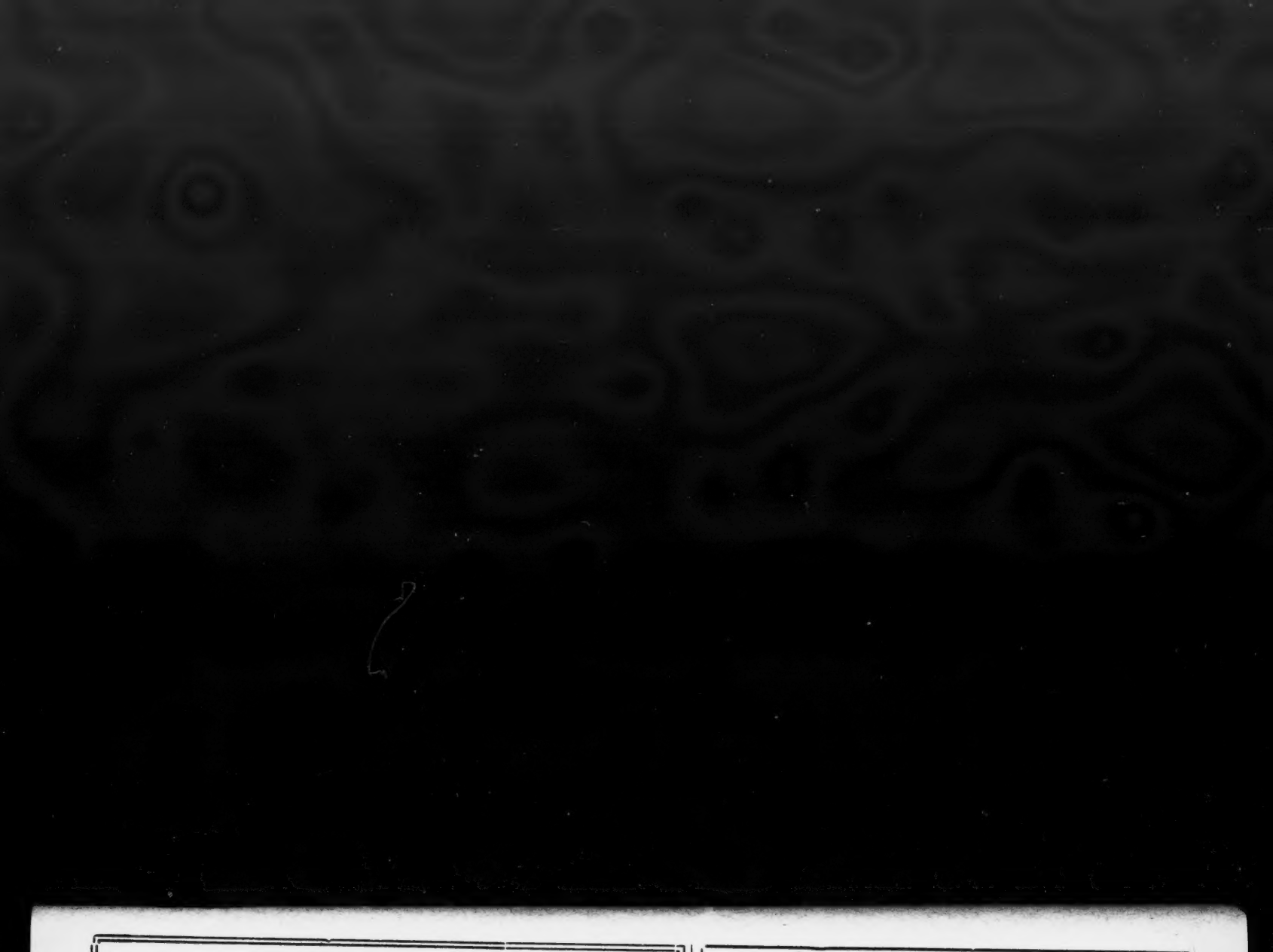

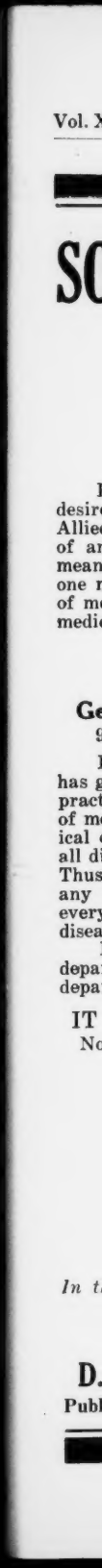

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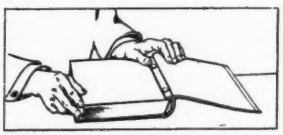

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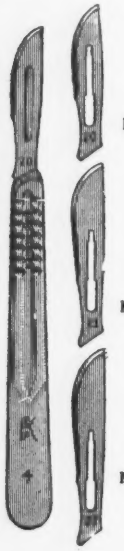

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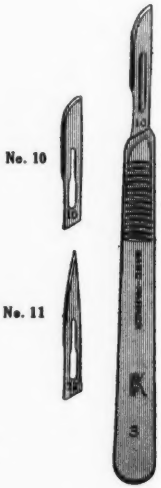

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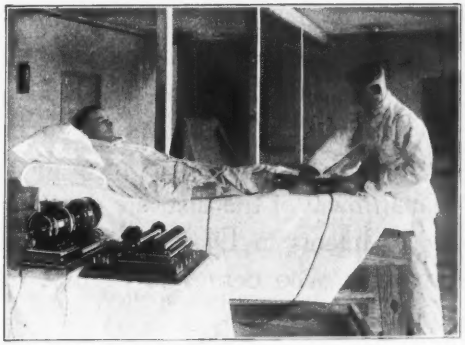

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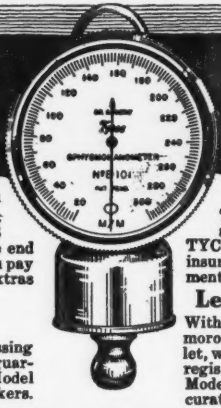

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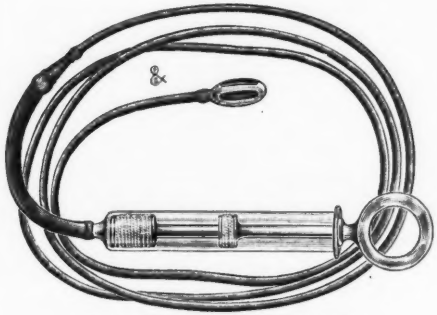

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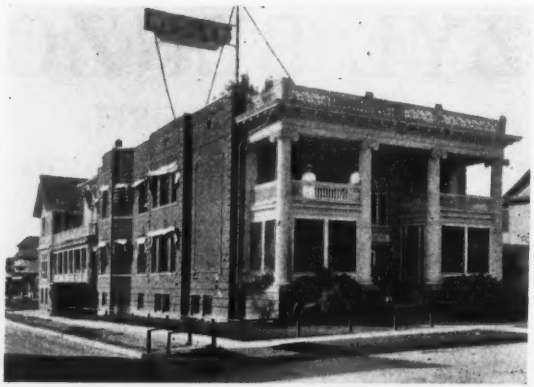

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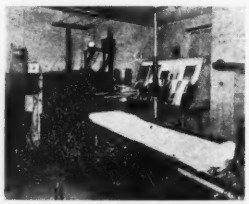

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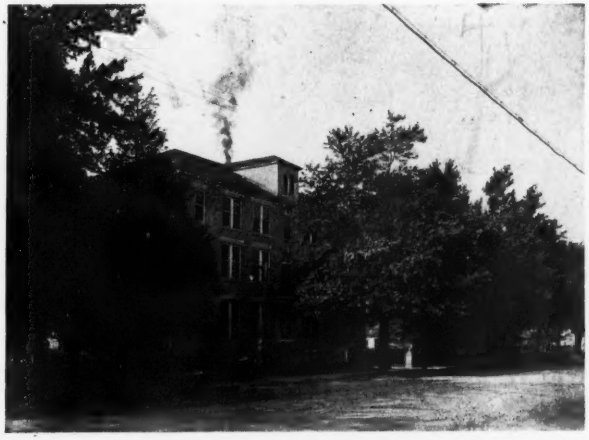

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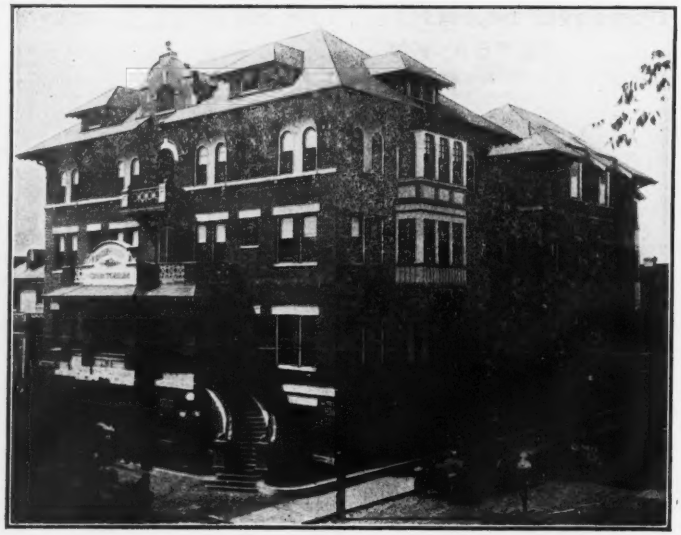

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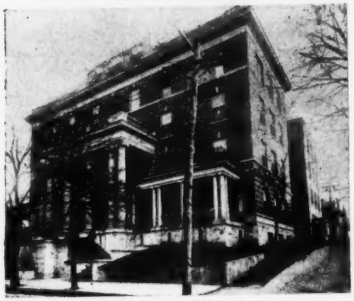

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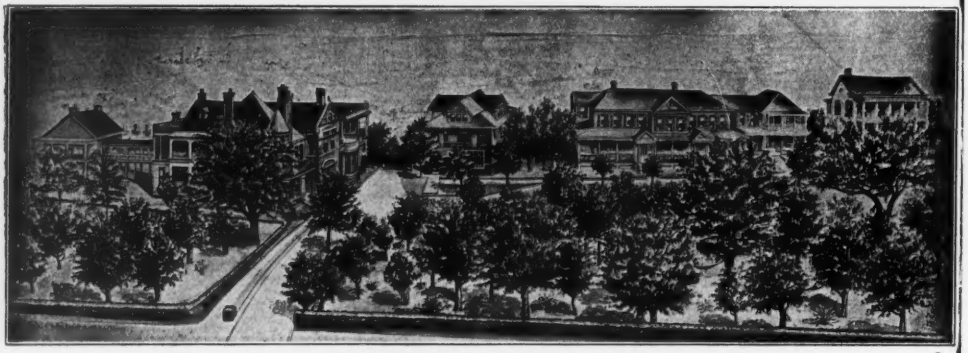

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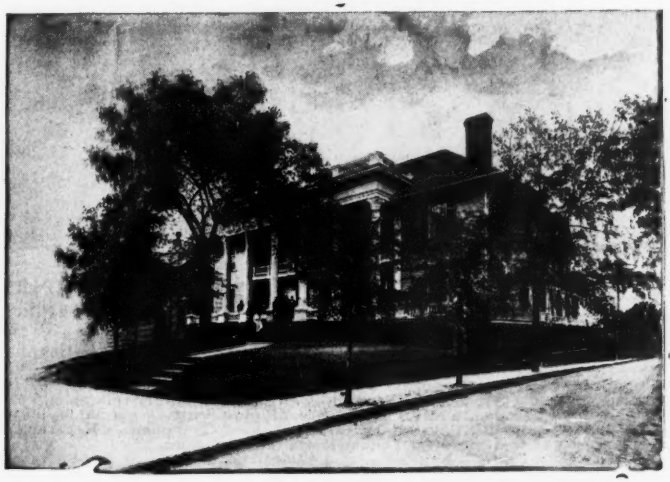

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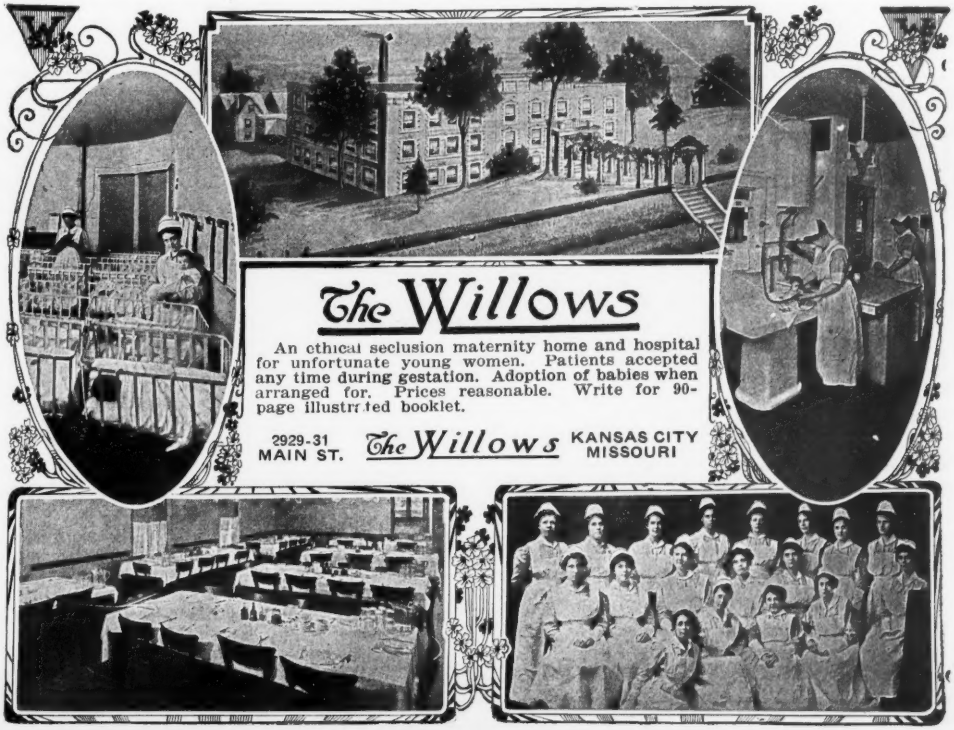
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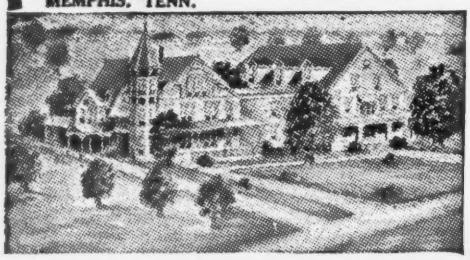

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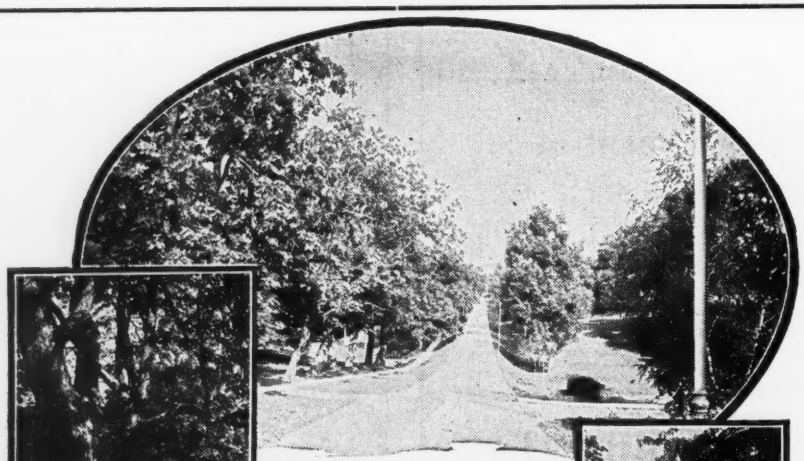

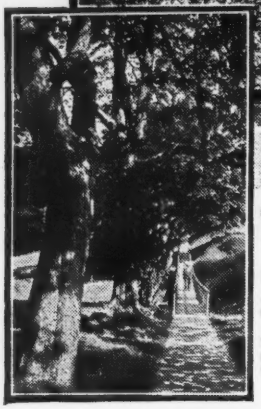

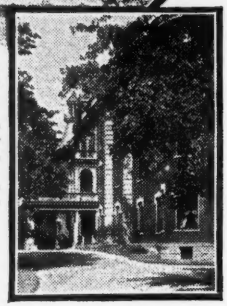

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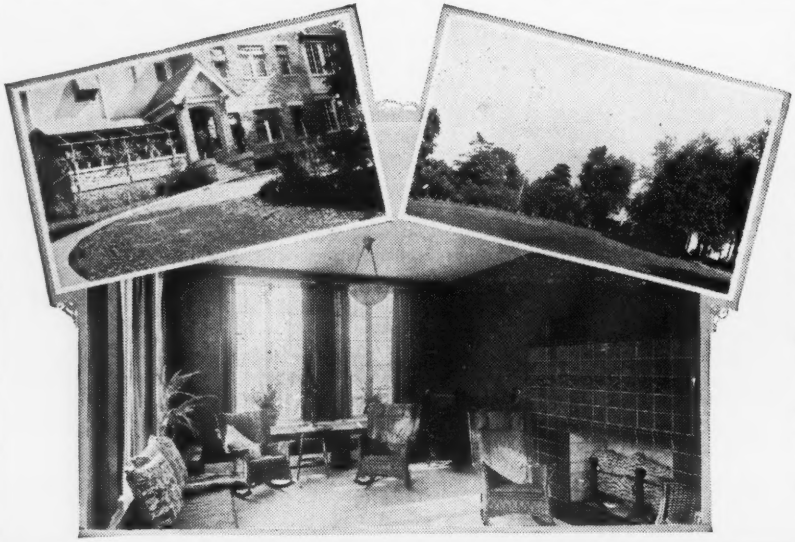

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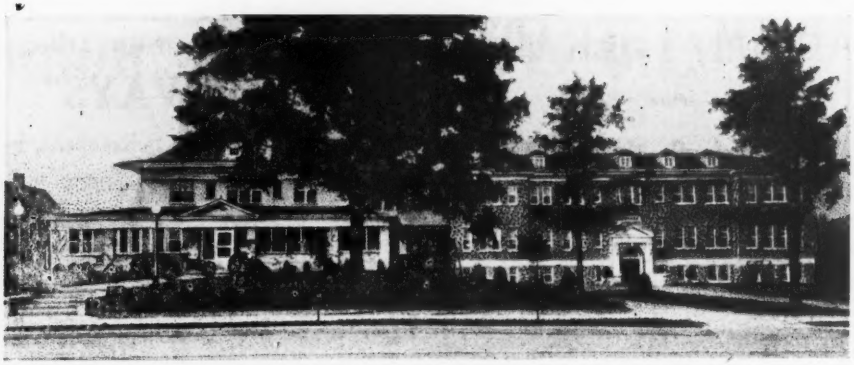

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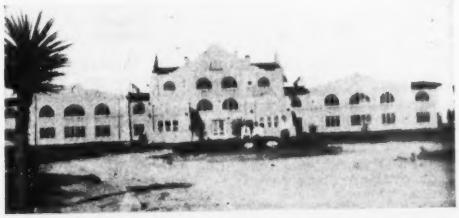

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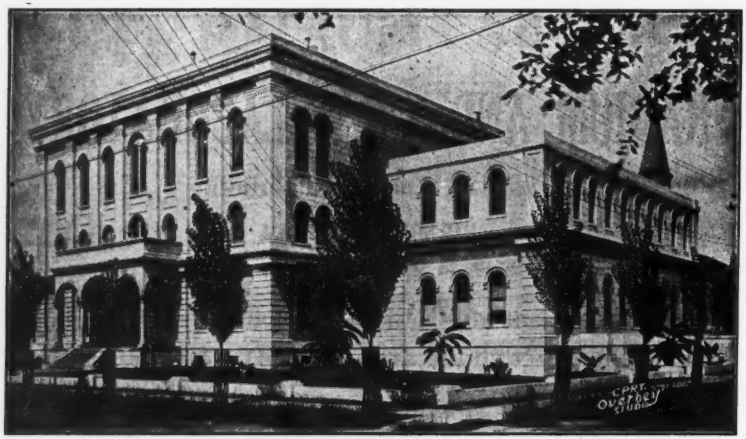

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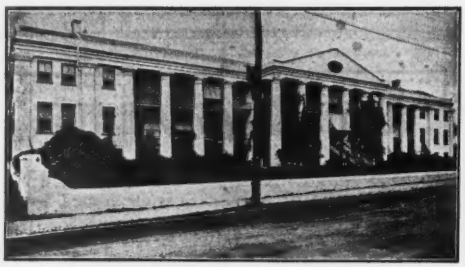

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# MEDICINE

## INTERNAL DISEASES, PEDIATRICS, NEUROLOGY, DIAGNOSTIC METHODS, ETC.

### THE ROLE OF DIGITALIS IN CARDIAC DISEASE*

BY FRANK A. JONES, M.D.,
Memphis, Tenn.

The title suggests questionaires. There was never a time when digitalis demanded more consideration at the hands of common-sense practitioners of medicine. It is now in the balance of two opposing opinions, namely: the laboratory man, with his graphic methods plus his enthusiasm and his fads, and the practitioner of medicine at the bedside, who has some opinions of his own.

In the domain of therapeutics there is no agent about which there is so much difference of opinion as to its physiological action. From Lauder Brunton down to Cushney there is a radical conflict among those who write books on therapeutics. Certainly Cushney entertains ideas that do not comport with present-day accepted views. To be very candid, there is no therapeutic agent more vaunted than digitalis. It accomplishes less with more extravagant claims than any remedy in the field of therapy.

It is very much like the cuckoo in running other birds out of their nests and taking all credit for all things. The enthusiasts use it after the fashion of the fly on the chariot wheel in Aesop's fables. After the chariot race was run the fly alighted from the hub of the wheel and exclaimed: "What a glorious race I had! Look at me! Did you ever see as much dust in a race?" It is becoming a fad for the enthusiasts to produce digitalis poisoning in order to accomplish results in such conditions as auricular fibrillation, sinus arythmia, myocardial insufficiency, etc. Some of the enthusiasts are even using it in partial heart block, in high blood pressure with its accompanying arteriosclerosis. Some have become so enthusiastic as to recommend it even in aortic insufficiency and to criticise severely those who express an opinion against its use in this, the most dangerous and most tragic of all the valvular lesions.

Some have become so enthusiastic as to make amateur pharmacists of their patients by advising them to take their digitalis with them as they do their pocket knife and desk keys.

We are hearing much about the pacemaker and about curves and leads, etc. Each cardiologist has his favorite preparation. The truth of the business is, nearly all of the preparations are inert.

We are hearing much about the units of value, and watching results by the graphic methods. It seemes that such authors as MacKenzie, Lewis and Keith are trying to overthrow the teachings of such masters as Walsh, Corigan, Broadbent, Sibson, Cheadle and many others.

To give digitalis in any form of heart block is like administering a purge in intestinal obstruction or ileus. When we speak of the bridge of his spanning the auricula-ventricular junction, the history of the case, the infections that have come before naturally suggest rotten timber in the bridge. In most cases this fibre is friable and degenerated. In myocardial

*Read in Section on Medicine, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

degeneration with arteriosclerosis and high blood pressure, giving digitalis accomplishes nothing but discomfort to the patient.

It matters not what methods are used or what preparations are administered, its action with reference to the *vis a tergo* and *vis a fronte* stands fifty-fifty. I notice that the enthusiasts in their flirtation with digitalis in the myocardial troubles have but little to say about such agencies as opium, rest in bed, elimination, diet, etc. Digitalis is their prima donna; the other agencies are merely chorus girls. In opera sometimes the chorus girls can excel the star, particularly if the leading lady has been on a drunk the night before.

Now as to its vaunted use in auricular fibrillation or any kind of fibrillation, its position is not secure in any sense. First, we must take into consideration what kind of fibrillation is it? What is back of it? What is the make-up of the patient? How much neurosis? How much functional condition? How much pathology? What diseases have been operating? What is the state of the artery and is there enlargement of the heart? It has been my good fortune to have seen this condition in all of its forms and varieties. A great many of these conditions are found in the female. Most of them are highly strung neurotic patients, frequently victims of arthritis deformans. It is a hard matter to separate paroxysmal tachycardia from auricular fibrillation. They are intimately linked; one suggests the other. I have gotten better results without digitalis in these cases than with it. Of course we all have our hobbies, but for me and my house morphin is the remedy of all remedies in either paroxysmal tachycardia or auricular fibrillation, regardless of etiology. Rest in bed stands next. Elimination is valuable. In these cases where they have been poisoned by digitalis I have had to resort to heroic purgation to drive out the infernal effects. Now as to digitalis in aortic insufficiency, it has no place. It matters not what type. I can do no better than to quote Broadbent:

"In the absence of mitral symptoms it is rarely that digitalis is called for in aortic incompetence or is of service, and it may undoubtedly do harm. It may set up sickness, which is an ominous symptom in this form of disease, and induce a condition of asthemia difficult to remedy."

When compensation fails in aortic insufficiency and when the mitral valve is open relatively your patient is ready for his grave. The patient goes to pieces after the fashion of Holmes' "Deacon's Masterpiece," "The One-Horse Shay." In mitral insufficiency with failing compensation digitalis has its place, but even here we must not forget the importance of rest in bed, purgation, diet, etc.

The day has come when conservative physicians must lift their hands against this proposition of poisoning patients with weakened hearts in order to get temporary benefits. The whole process is analogous to the old school physician salivating a man with calomel for its alterative effects, or like slapping on a blister to cure pneumonia, or like curetting a woman every time she has a slight flow. The crying need today in medicine is conservatism. The whole fabric is enervated with hypertechnical hair-splitting science. We need more real applied common science, more individual thinkers and less automata. Let us all take a lesson from Pope when he said:

"Be not the first by whom the new are tried,
Nor yet the last to lay the old aside."

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Discussion follows paper of Dr. Robinson, page 400.

## THE VALUE OF LARGE SINGLE DOSES OF DIGITALIS IN THE TREATMENT OF HEART DISEASE*†

By G. Canby Robinson, M.D.,
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The action of digitalis has been studied extensively both experimentally on animals and clinically, yet much remains to be settled. The question of dosage, of the best preparation, of the types of cardiac

*Read in Section on Medicine, Southern Medical Association, Thirteenth Annual Meeting, Ashville, N. C., Nov. 10-13, 1919.

†From the Department of Internal Medicine, Washington University.

cases to which digitalis is beneficial and of how the beneficial effects of the drug are brought about are some of the practical points that are still open for discussion. In this paper the question of the method of administration, of dosage and of the type of cases in which digitalis is especially useful, will be discussed in the light of an experience with the use of large single doses of the drug in heart disease.

It is a well known fact that digitalis must be administered for several days when given in the usual doses before definite effects are produced. It has become generally recognized that the drug is not effectual until a certain amount of it accumulates, presumably in the heart. The amount of the drug necessary to affect the heart when given in the usual doses by mouth has been studied by various observers, notably by Eggleston,[1] and by Cohn, Fraser and Jamieson.[2] Various criteria such as the appearance of disturbance of the cardiac mechanism, changes in the T wave of the electrocardiogram and symptoms of incipient intoxication have been used as indicative that the drug has become effective. Eggleston determined the amount of the drug necessary to produce therapeutic effects in a series of cases, and from his results he calculated the amount necessary to produce these effects when given in amounts relative to the body weight. Having determined the total dose, Eggleston administered the drug not in frequent small doses, as is usually done, but in very large doses, so that the calculated total amount was given in several doses, or even in a single dose. His results led me to believe that this method might prove not only useful as a therapeutic measure, but would also afford a very favorable condition for studying the rapidity of action, persistence and absorption of the drug when given by mouth. The administration of a large single dose of digitalis rather than a series of small doses makes the relation of cause and effect much clearer and more easily determined, and has proved of much value in solving some of the disputed points regarding digitalis. Some of the results of the experience with the drug given by this method have already been reported. The present paper presents the therapeutic advantages of the method as observed in a series of about one hundred cases in which single large doses of digitalis were administered. The drug was given by mouth in the form of the tincture and the dose was regulated according to Eggleston's recommendations, in terms of cat units per body weight of patient. In carrying out this procedure it is first necessary to standardize the tincture by the cat method of Hatcher and Brodie.[3] The tincture was obtained from a reliable manufacturer and each lot was standardized before being used. This method consists in determining the minimal lethal dose of digitalis per kilo body weight of cat when a measured amount of the diluted tincture is injected intravenously followed slowly by small doses of a ouabain solution. The minimal lethal dose of the ouabain being a known constant, the amount used will vary according to the strength of the tincture. The strength of the tincture can thus be determined. Some manufacturers are now using this method of standardization, and the strength of each bottle of the tincture is indicated by giving the amount in cubic centemeters which is fatal for one kilo body weight of cat. This constitutes one cat unit. In the tincture which we used approximately 1 c. c., or 15 minims, equaled one cat unit.

The dosage was calculated by weighing the patient and giving 0.15 of a cat unit per pound of body weight, or 15 c. c. (4 drahms) per hundred pounds. This dosage is very slightly larger than that used by Eggleston. The total amount of the tincture given was usually from 15 to 25 c. c. (4 to 6 drachms). This amount was given as a rule in a single dose, although divided doses were used in a few of the earlier cases. When much edema is present the estimated weight of the fluid in the tissue is subtracted from the total body weight in calculating the dosage. At times the dose was reduced because of clinical indications that the drug might not be well borne, and particularly when there was a possibility that the patient had been receiving the drug immediately before entering the hospital. The previous use of digitalis must always be taken into consideration, and in our series care was

taken to make sure that the patient was not under the influence of digitalis when the large dose was administered. This was usually determined either by the history or by the statement of the physician sending the patient into the hospital or by a period in the hospital of six to ten days without the administration of the drug.

A period of several days' observation with the patient in bed before digitalis was given was nearly always carried out besides a careful study of symptoms. The heart rate, blood pressure, size of heart, urine output, electrocardiograms and other routine examinations were recorded before the drug was given and were followed afterwards. In cases showing auricular fibrillation, the heart rate was counted several times a day by a member of the medical staff using the stethoscope over the heart and the radial pulse rate was counted at the same time. These rates, together with the differences between them, the pulse deficit, were charted and proved very useful in following the effect of the drug in these cases. These counts were made frequently after the tincture of digitalis was given, in some cases at fifteen minute intervals for several hours.

No permanent bad effects were ever attributable to the large doses of digitalis. In about 10 per cent of the cases some of the drug was vomited within a few minutes after being taken. This occurred usually in cases which had a tendency to vomit when anything was taken by mouth. About the same number of cases complained of nausea and loss of appetite half an hour to an hour after the drug was taken. These cases evidently suffered from the effects of the drug on the central vomiting mechanism while the nausea and vomiting in the former group may have been caused by local effects of the tincture on the stomach. In no case were these symptoms serious. In only one case was the cardiac mechanism disturbed in such a way that the cardiac efficiency was apparently impaired. In this case frequent premature ventricular beats arising from various points in the ventricles as indicated by electrocardiograms seemed to disturb the circulation. The cases to which the large single doses of digitalis were given may be divided into two groups: those showing a constantly irregular heart caused by auricular fibrillation, and those showing a normal cardiac mechanism. It is necessary to consider these two groups of cases separately, partly because the group showing auricular fibrillation was studied more closely. The cases showing auricular fibrillation constituted somewhat more than half the number to which digitalis in large single doses was administered and in those cases the most striking benefit was often seen. Twenty-six cases have been selected and tabulated. They were selected as presenting the most favorable conditions for demonstrating the effect of the large doses of digitalis. These cases of auricular fibrillation all showed an abnormally rapid ventricular rate, which was in part responsible for the signs and symptoms of cardiac insufficiency that were present. When digitalis was given, slowing of the heart took place in a very striking manner and there was usually a corresponding improvement of symptoms.

Of these twenty-six cases there were sixteen cases in which the onset of the digitalis effect could be determined. In these cases the drug began to be effectual in from two to five hours. In all of these cases the maximum slowing of the ventricles had taken place within twenty-six hours and in six cases the maximum effect occurred in from six to nine hours. A case recently studied showed a ventricular rate of one hundred and sixty per minute for several days before 10 c. c. of the tincture were given, and in one hour the verticular rate fell to one hundred and forty-eight and continued to diminish until it was ninety-six per minute.

These cases show that when the dose is large digitalis administered by mouth affects the heart quite rapidly, although the maximum effect is rather slow in developing. The study of the twenty-six cases showed that the ventricular rate remained slow for a variable length of time, but averaged about ten days after the single large dose of the drug was given. These questions of rapidity and persistance of action of digitalis have been discussed at some length in a recent paper[4] and will not be considered further here. The actual change in heart rate that oc-

curred in some of these cases is shown in the charts that accompanied that paper. The tincture of digitalis in our cases seemed rapidly absorbed and at a fairly uniform rate.

The improvement of symptoms which followed the slowing of the ventricular rate in the selected cases of auricular fibrillation was often as striking as were the changes in heart rate. The patients almost constantly had a sense of general improvement in from three to twelve hours. They usually noticed that their cardiac palpitation had ceased and frequently the breathing became markedly better. Several cases showed a great increase in the output of urine, the output going in one case from about 1,500 c. c. (48 ounces) to over 5,000 c. c. (100 ounces) in twenty-four hours with a very rapid disappearance of edema. The patients usually slept better after receiving their doses of digitalis and the nightly doses of morphin, which had been frequently necessary previously, were no longer used. In a word, all the valuable effects of digitalis that are obtained in cases of auricular fibrillation with rapid ventricular rates were seen when a single large dose of the tincture was given by mouth, but instead of requiring several days or a week, it often required no more than twelve or twenty-four hours for their development.

The effect of the large dose of the tincture of digitalis on the cases that showed a regular heart with normal cardiac mechanism was quite different from the effect on the cases with auricular fibrillation. The heart rate was usually not appreciably slowed by the drug. Occasionaly the output of urine was increased, but this was by no means constant, and the improvement of symptoms did not occur with the regularity that was seen in the cases with fibrillation. A comparison of the two groups of cases affords a striking example of the fact that it is in cases with auricular fibrillation that digitalis serves its greatest usefulness.

The effect of large doses of digitalis on blood pressure was not constant, but it was observed in a number of cases that the systolic pressure tended to approach more nearly the normal level after the drug was given. In other words, elevated blood pressure was seen to fall while abnormally low pressure rose after the drug was given. This experience is comparable to that of Eggleston.[5]

Electrocardiograms generally revealed a slight or in some cases a striking prolongation of the auricular-ventricular conduction time and the T wave of the ventricular portion was at times, but not constantly, inverted after the administration of the drug.

The question of dosage is one that needs further study. Recently smaller doses have been given to a few patients with the idea of determining whether or not half of the original dose would prove as efficacious as the full dose. Our experience with the reduced doses is not as yet sufficiently extensive to warrant definite statements. It appears, however, that smaller doses may effect the heart as quickly as the full doses, but not so markedly and the action persists for a much shorter time. Another problem which is under investigation by one of the workers in our laboratory is the relation of dosage to body weight, especially the optimum dosage for children. Again no definite statements can be reported, but it appears that children require doses which are larger relative to body weight than do adults.

There are many cases of heart disease that should be kept constantly under the influence of digitalis. In order to accomplish this after a large single dose, it has been our custom to give half the original amount when there is evidence that the initial dose has ceased to be effectual. This is usually in seven to ten days after administration. Then in a shorter time than the interval between the first and second dose, usually in two or three days, the patient is started on small frequent doses, from five to fifteen drops three times a day being used. In most cases of auricular fibrillation this seems to be a sufficient amount to keep the ventricular rate at about normal, to prevent a pulse deficit and to maintain the heart at its maximum efficiency.

## CONCLUSIONS

The administration of the tincture of digitalis in large single doses is advocated as a useful method of treatment in certain cases of heart disease provided the tincture is standardized, the dosage regulated as de-

scribed in the paper and the patient is kept under close observation. This method of administration not only brings the heart rapidly under the influence of the drug, but also affords a more accurate means of studying its effect than the older methods of small repeated doses.

The use of large single doses is apparently not dangerous under the conditions specified. Problems of dosage especially to body weight still need solution. The beneficial effect of digitalis in cases with cardiac irregularity caused by auricular fibrillation is especially emphasized by our experience with large single doses in this condition.

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## DISCUSSION

Papers of Drs. Jones and Robinson.

*Dr. P. S. Roy, Washington, D. C.*—I should like to ask Dr. Robinson whether these cases of mitral stenosis had fibrillation of the auricle? He has given us a beautiful illustration of what digitalis will do. This evidence extends over many years and can not be disputed by any man, that when digitalis is given to a patient with an irregular heart above 100 it will help the condition very materially.

You can not in auricular flutter always measure the beat, but you see the wonderful results obtained from the use of digitalis.

I want to say this in clearing up the mind of Dr. Jones as well as our own minds as to what digitalis is really expected to do. Digitalis will not act favorably in all cases of heart disease. MacKenzie, Lewis and others have in the last year emphasized the fact that the best results from digitalis are in heart cases with the pulse above 100 and irregular. Sir John Broadbent, of England, gets excellent results from digitalis in a heart over 100 without irregularity. It has been said that you can not show brilliant results without an irregular heart over 100. The question whether you can benefit a heart normal in beat and rhythm has been discussed very much. Dr. Christian, of Boston, in the last year has written a paper on this subject. He has obtained excellent results from digitalis where the heart muscle was not performing its function, but was regularly under 100. I have no doubt he used controls; that he put some cases without digitalis at rest, and others had rest without digitalis. His report shows that digitalis will often help in myocardial changes where the pulse is regular not only in beat but in the number of beats.

Dr. Jones mentioned auricular fibrillation. I think auricular fibrillation can be told instantly if you use an instrument. When you get into the habit of using a polygraph or sphygmograph you can usually tell auricular fibrillation by physical examination. Listen to the heart and feel the pulse. You hear in the heart a number of irregular small beats that do not come through to the wrist.

Aortic regurgitation needs no treatment whatever until the heart gives out, and when this comes, it is hard to restore it. I do not believe many cases of aortic regurgitation are helped by anything, except in syphilitic cases. As long as the heart muscle is acting a man can do any amount of work and does not know that he has heart disease or aortic regurgitation. I should not allow a patient to die with aortic regurgitation without putting him to bed and testing what digitalis would do.

*Dr. H. A. Christian, Boston, Mass.*—It seems to me a fair criticism that should be made of most papers on treatment is that they contain too much theory, too much impression, and too little fact. Facts can be obtained just as well at the bedside in private practice as in a hospital or in a laboratory. Not always the same kinds of facts can be obtained in the different places, but valuable facts can be made out in every place, and I think it a fair criticism of the profession to say that insufficient effort is made in observing patients toward obtaining facts.

Let us take the question of digitalis therapy. How can we expect to get anywhere unless we know, first, what dosage of digitalis is used? You can not very well compare the treatment of one man with that of another man unless you can reduce it to terms of the same thing. How can you reduce digitalis to terms of the same thing? How can you reduce digitalis to terms of the same thing unless you know in some standardized form what the efficiency of the digitalis is? Again, how can you compare methods of treatment unless you know whether the two individuals you are treating are the same kinds of cases? There are cardiac cases and there are cardiac cases, and one differs from the other in its mechanism, in its pathology, in its symptomatology, and in its response to treatment. We can not absolutely diagnose every case in terms that will make them directly comparable, but we can approach that ideal by making careful observations by all methods and by recording these observations. Then, by treating the cases in the same way and recording the results, we will have data worthy of consideration. That necessitates in these cardiac cases in relation to digitalis knowing, first, what effect the digitalis is going to have on a theoretical basis, that is, knowing the pharmacological action of digitalis on man, and in the second place, in knowing whether these effects are being produced in the individual case. We can get that information in various ways. We can observe the effect on edema by weighing the patient and noting a fall in weight.

We can get another measure on the edema by observing the urinary output from day to day in relation to fluid intake and seeing whether it is increasing, decreasing or remaining constant. We can measure the effect of the digitalis on the pulse rate, whether the pulse deficit is disappearing, whether the heart is slowing in rate, and so forth. We can measure the effect of the digitalis on the respiration by observing the rate, the comfort or discomfort in breathing, whether the vital capacity of the lungs increases or not. And there are very simple methods of making these observations. In those various ways we can accumulate a certain number of facts in the individual case and compare them with facts from our own observations made on other cases. Or we can compare them with the observations made in other places by other men. We have to admit at the present time that our knowledge of therapeutics is the smallest part of the armamentarium of the physician, and it is a field in which most investigation is needed. I am very glad to say it is the field in which most active studies are going on all over the medical world wherever medical men practice.

Dr. Jones' particular idea is directly in opposition to my own experience.

The point I think to be emphasized in these papers on treatment is that we need more facts and less fancy, and a fact is obtainable if we take the trouble to obtain it. The difficulty is that most of us tend to state impressions because they are more easily obtained. Most people fight over facts, and very few people fight over fancies. If we had more facts to discuss we would have fewer differences of opinion.

*Dr. James S. McLester, Birmingham, Ala.*—After listening to Dr. Robinson's accurate and painstaking observations I feel embarrassed in speaking of the rather hap-hazard manner in which we in Birmingham have used digitalis.

About five years ago, after an unsatisfactory experience with digitalis, we hit upon the plan of giving very large doses. We have been giving one-half ounce of the tincture to each patient who entered the hospital with evidence of cardiac incompetency, provided the patient was at that time not under the influence of digitalis. After an interval of one or two days we have followed this by giving twenty mms. of the tincture three times daily. In this way we get results very quickly and sometimes the patient appears miraculously better within twenty-four hours.

We have used during this period the tincture made by almost every well known manufacturer. It is unfortunate that we have not standardized the drug. The only standardized digitalis which we have used has been a limited supply which Dr. Hatcher kindly sent me a few years ago.

It has seemed to us that the preliminary purgation has hastened the effect of the digitalis. I am sure that the average physician fails to give enough digitalis and that a great deal of dissatisfaction with the drug arises from this cause.

*Dr. J. Birney Guthrie, New Orleans, La.*—There is nothing more striking in my own experience than watching the response of a case of auricular fibrillation to digitalis, if any response is to be obtained. Failing this, the patient is usually hopeless.

The paper of Dr. Robinson serves to emphasize the necessity of giving large doses of digitalis and the necessity for establishing that large dosage. I have tried his method for administering it in a single dose by mouth and also by the intravenous method. One objection to the use of digitalis by mouth in large doses is nausea. In my own experience this nausea has occurred quite frequently; it may have been due to a peculiarity of the digitalis used. The vomiting of the medicine creates uncertainty as to the dosage. A patient needs digitalis when we observe auricular fibrillation. That digitalis should be used in such cases is one of the axioms of medicine today. He needs digitalis or some of its substitutes. If digitalis fails, everything fails as a rule. If we give it by mouth and the patient vomits, we are uncertain how much digitalis has been absorbed. Unless we establish proper dosage and get it in a certain time, we fail of our effect. Therefore, I have used the ordinary tincture intravenously in preference to the route by mouth with rather strikingly satisfactory results. The vehicle seems to be a glucose solution rather than a salt solution, because most of these cases are edematous. I have frequently used ten c. c. of the tincture intravenously in 250 c. c. of 5 per cent glucose solution.

*Dr. J. H. Pratt, Boston, Mass.*—The greatest physicians in the past generation have favored the use of digitalis. One of the most eminent physicians living has stated that he would not care to practice medicine were it not for digitalis. Another one affirms that he can tell a good doctor from a poor one by the way in which he uses digitalis, and our own Osler has said that digitalis is one of the few drugs that is worth a lifelong study.

Fifteen years ago, if I had heard Dr. Jones' paper, I would have agreed with him, and I think most of you would have agreed with him, because at that time in this country very little good was obtained from digitalis even in the leading hospitals and teaching centers. Personally, I never saw any striking results from the use of digitalis until the year 1905. I was puzzled at this. I could not understand why I could not get the striking results described in the text books. Finally, I secured from Germany some of Merck's powdered leaves. The first patient to whom I gave this new digitalis had an absolutely irregular pulse with a rate not below 120 during the preceding six months in spite of the administration of both tincture and infusion in the usual dosage. It was a case of auricular fibrillation, but in those days we knew nothing about that condition. I prescribed 0.3 gram of the imported powdered leaf daily. When I saw the patient a week later the pulse rate was normal and her symptoms were greatly relieved.

I believe the reason that many physicians today are still skeptical about the value of digitalis is due to the fact that they do not give enough digitalis in suitable cases to obtain the physiological effect. Much of the digitalis on the market is so weak that it has to be given in doses two to four times as large as that usually employed in order to get the desired action. I have seen a patient take over an ounce of the tincture of digitalis in

a few days without any apparent effect, but that was a poor preparation. The activity of digitalis can be determined on cats and frogs, but it may not be possible for all of us to secure a standardized preparation. The strength can be found by careful observations on patients, especially in cases of auricular fibrillation with rapid pulse. If the ancient rule of Withering, who introduced the drug into practice in 1785, had been followed digitalis would never have fallen into disrepute and weak and inert preparations would have been quickly detected. "Let the medicine be continued," he said, "until it either acts on the kidneys, the stomach, the pulse, or the bowels."

*Dr. I. I. Lemann, New Orleans, La.*—One of the disadvantages of the single dose method that he has already mentioned is the danger of gastrointestinal upset. Striking results of a single large dose of digitalis are comparable to the results we have seen from the intravenous use of strophanthin. When it succeeds the thing is dramatic; when it fails the results are tragic. It seems to me we might have the great advantage of larger doses by distributing the large doses over a period of 24 or 48 hours.

The lesson that ought to remain in our minds is that we have been using insufficient dosage of digitalis and we have not been using digitalis for its effect. As Dr. Pratt pointed out, it is necessary to push digitalis and give it until you do get effect. Then perhaps it is time to stop and wait until the effect has passed away, to return then to the digitalis. I wish to point out in that connection the advantage of intermittent doses of digitalis in cases where the compensation has been restored—cases where, after hospitalization and large doses of digitalis over a short period of time, the patient is restored to usefulness. It is necessary very often in these patients to keep up some regular method of administering digitalis intermittently, perhaps by giving digitalis on certain days in the week. I have devised a scheme of giving it three or four days in the week in much smaller doses than in the condition of broken compensation.

Finally, I wish to say a word about the cases of aortic regurgitation with broken compensation. In the large number of cases which it is our fortune to see in the negro male service at the Charity Hospital, the same laws apply to broken compensation of aortic regurgitation which apply to cases of broken compensation of mitral disease. In other words, it seems to us that not all the cases of aortic regurgitation with broken compensation are hopeless.

*Dr. William de B. McNider, Chapel Hill, N. C.*—From the laboratory point of view, it might be wise to say something in connection with this discussion. I suppose the work of Cushny has done more to put digitalis on a firm foundation than the work of anybody else unless it is that of MacKenzie. Every once in a while you hear of digitalis being given along with atropin. From a laboratory point of view, and I think also from a clinical point of view, that is unfortunate.

In these cases of auricular flutter, according to Cushny, and I think his work is beyond dispute, its beneficial effect is in increasing the conducting power in the ventricle. It enables the impulse to go into the ventricle, but it also slows the heart. It does this through its effect on the vagus mechanism. There are two factors considered here: increasing the conducting power into the ventricle and the effect of digitalis on the vagus mechanism in slowing the heart, decreasing its rate. If you give atropin with digitalis, you cut out one of the points of contact, namely, the vagus nerve, and you certainly clinically do not get the same effect from digitalis that you would get if you gave it without the atropin.

*Dr. Seale Harris, Birmingham, Ala.*—I want to call attention to the question of the preparation of digitalis. Some years ago I began to lose faith in digitalis as a drug, after having tried various tinctures and fluid extracts and a number of proprietary preparations that were on the market. I happened to read an article in the *American Journal of the Medical Sciences* by Theodore Janeway. He reported what I believe was the most extensive observations that had been made in this country on the effects of the different preparations of digitalis. In this article he compared the different preparations, the infusions and tinctures and fluid extracts and some of the proprietary preparations. The preparation he used, and the one that he derived the greatest benefit from, and with the greatest regularity, was the freshly prepared infusion from Allen's English leaves. The elder Janeway was a great believer in digitalis therapy, and he had made many observations on the drug himself. He had found that Allen in England made the specialty of raising digitalis. He collects the leaves at a certain time. They are uniform in appearance and look somewhat different from the ordinary digitalis leaves on the market.

After reading this article I had my druggist order some of Allen's English leaves and had him prepare an infusion each time the drug was used. There was a great difference in the results. I wish to commend to you the freshly prepared infusion. It seems to be better borne by the stomach. The results in my hands certainly were all that could be desired.

*Dr. Jones (closing).*—In the first place, I wish to answer my friend, Dr. Christian. There are facts, fancies, and fads in medicine, and I do not know which is the greatest evil of the three.

The question has been asked what form of digitalis did I give. I beg to say very positively, all forms, all kinds, in season and out of season, from digipuratum down to digitaline and fat free. The world for a while said we must give fat-free digitalis and a salt-free diet in nephritis; that the two went together. I have given digitalis for the last twenty-two years of my hospital life. I have held two cardiac clinics a week and we had more cases of cardiac disease than we could possibly utilize. I think I have some power of observation. I have had some clinical experience. I think I know the symptoms of cardiac diseases when I see them, and I have yet to see in my experience where any type or any kind of digitalis, watched carefully and thoroughly, has come up to what has been claimed for it.

I am delighted that Dr. Robinson brought before us a graphic method of auricular fibrillation. I have seen these cases of fibrillation. Per-

haps digitalis is of some value in such cases, but I should like you to place the value where it belongs. Do not underestimate the value of the other things. I have noticed that you are inclined to give the patient a purge. I note also you put him in bed, and where there is much dyspnea, with a tendency to edema of the lung, morphin and atropin are given. If you were to ask me what I think is the sovereign remedy in the types of fibrillation mentioned here this morning, a remedy that has as much effect as any is morphin and atropin. There is nothing that will hold down an irritable heart and myocardium like morphin. It will quiet the nervous instability. The majority of cases of auricular fibrillation are very highly strung people and I venture to say also that some cases of tachycardia are relieved of the fibrillation when there is intense nervousness.

I have taken cases of mitral insufficiency with failing compensation and cases of aortic insufficiency with failing compensation, and have put one group of cases in one ward and another group in another ward, all the same bad type of patients, and have kept them quiet, given them tepid baths, given them a nourishing diet, kept them easy with no digitalis. Then I have said to the interns: "You take a group of cases of mitral insufficiency with failing compensation, give them digitalis, digipuratum, and watch them. Let us make a study of these two groups of cases. Those cases with edema, a little albuminuria, a little hydrothorax, general hydremia, and anasarca beginning, and give them digitalis, and to the other group do not give digitalis." What may seem a fact in Tulane may not be a fact in Johns Hopkins, and what may be a fact in the Peter Bent Brigham Hospital, may not be a fact in the Massachusetts General Hospital. In my hospital service these cases are facts; they may be fancied facts. Briefly, the cases that did not get digitalis did just as well, got out of the hospital in the same length of time, and did not return to the hospital any sooner than those who were given digitalis.

*Dr. Robinson (closing).*—The question of control of cases in the study such as we have carried on is an important one. We have endeavored to reduce the cases to a base line, so to speak, by rest in bed and by general hospital routine, for a period of ten days and have not used digitalis until we have ruled out the effects or determined the effects of rest, purgation and such measures.

Massive doses of digitalis as we have described are not advocated for immediate use. But I feel that it is time, after having studied this series of cases, to bring them before you with the idea of modifying your views and stimulating ideas in regard to the use of digitalis.

The question of the effect of digitalis on the gastro-intestinal tract is a very interesting one. The drug acts not alone on the heart and circulation, but also on the central nervous system, and it may produce vomiting through this action on the central nervous system. Hatcher has demonstrated this. I have seen him give digitalis intravenously to an animal whose stomach was removed. There was no question of the digitalis entering the stomach, because the animal had no stomach. But he went through all the motions of vomiting soon after the digitalis was given. Hatcher has proven that digitalis causes gastro-intestinal disturbance not alone through its action on the gastric mucous membrane, but after absorption through the nervous vomiting mechanism. The fact that vomiting is produced is a safety valve, so to speak; an overdose of digitalis will be vomited. I feel we should attempt to give it in such doses that nausea and vomiting are prevented, but the appearance of nausea is a very excellent measure to gauge the dosage. If loss of appetite and nausea are produced, it is an indication that the patient is beginning to show toxic symptoms of digitalis.

Dr. Roy's rule is, it seems to me, an excellent one, using digitalis and expecting valuable results from it where the heart is irregular and the rate is above 100 beats per minute. That is a safe and excellent working principle.

The question of continued doses is one in which judgment and discretion should be used. There are cases of cardiac failure, with auricular fibrillation, that can be kept in a state of health, or a state of comparative health, when taking digitalis constantly in small doses. We have a number of cases we have been treating for five or six years, taking digitalis constantly in the usual doses of five, ten or fifteen drops three times a day. I say drops instead of minims, because patients measure it that way. These patients may be free of symptoms while taking the drug and will immediately show symptoms when the drug is stopped. The reason is, when they are digitalized the impulses that descend from the fibrillating auricles are blocked and the ventricles remain slow and efficient.

I was very glad Dr. McNider mentioned the importance of the relation of atropin and digitalis. Certainly they act one against the other.

I also feel that Dr. Jones' remarks about morphia are valuable. Morphia is a most useful drug in cases of cardiac failure, but it is not a drug we wish to use any longer and more often than we have to.

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## A CASE OF BALANTIDIUM COLI INFECTION*

By W. O. Nisbet, A.B., M.D.,
Charlotte, N. C.

DeBuys states that Balantidia coli were probably first observed by Lieuenholk in his own stools in 1857 and that Malmston and Loven in 1857 first described B. coli as Paramecium coli; in 1862 Malstom reported two cases and that Stein in 1867 proposed the name of Balantidium coli. Since that time cases have been reported from Russia, Sweden, Italy, Germany,

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China, Africa, Philippine Islands and North America. The foreign literature has been fully reviewed by various writers.

### AMERICAN LITERATURE

The first case in American literature was reported by Mitter[1] in Iowa in 1891. Other cases have been reported by Bel and Couret[2] in Louisiana. This case was that of a colored male, aged 40, and a native of Louisiana.

Gray[3] has reported three cases from Arkansas; no mention is made of the patients' nativity. Gray claims complete recovery by the use of thymol enemas in olive oil, and thymol by mouth in two of his cases. His patients were male, aged 55 and 58; in the third case the age was not given.

Deadrick[4] reports one case in eastern Arkansas.

Sistrunk[5] reports one case in Minnesota. The patient had suffered for twelve years with chronic diarrhea. He had always lived in Minnesota. No mention is made of treatment.

Two cases in North Carolina[6] and one in Mississippi[7] are noted in the annual reports of the Rockefeller Sanitary Commission.

Jenning[8] reports a case of infection in an adult male associated with severe anemia; no mention is made of patient's place of nativity. This case showed characteristic recurrences with temporary improvement following colonic irrigation with quinine solution and salt solution.

Young and Walker[9] report a case, male, white, aged 60, native of Kansas for 38 years, Oklahoma 22 years. The treatment used with only temporary relief was enemata of quinine solution.

In addition to the cases here noted, Dr. Mallory, of Boston, and Dr. Van Wart,[10] of Baltimore, each report encountering a case at autopsy at these places.

Smithys also mentions a case in giving a list of parasites found during routine examination.

DeBuys[11] reports a case in a colored boy five years of age. The patient was lost sight of before treatment could be instituted.

Bassler,[12] of New York, mentions two cases which were benefited by transduodenal lavage with phenolphthalein saline solution.

DeBuys in a foot note speaks of a case which came to his knowledge after publication of his article (*American Journal Diseases of Children*); emetin was used with prompt results by the attending physician.

### CASE REPORT

J. C. A., age 65, farmer, was seen for bowel trouble at the request of his family physician at his home in the country. The patient had always lived in Mecklenburg County and had visited outside of the limits of North Carolina only twice, and then for a few days in an adjoining county in South Carolina.

His home surroundings were that of the average farmer of moderate means. Drinking water came from an open well in the yard; near by was a pig sty with drainage away from the well. Analysis of the well water by the city bacteriologist showed no contamination. The patient had always fed and also butchered his hogs for the market.

The family history was negative except that one daughter was a cretin. No other member of the family had suffered from intestinal disturbances.

The patient had had no illness except an attack of diarrhea with simple watery stools of several months' duration when ten years old. He was entirely well until 1891, when another attack of diarrhea began, lasting for fifteen months; no blood or mucus were found in the stools at this time. No more trouble occurred until 1914, when there was a return of the diarrhea with watery stools and some loss of weight. There were periods of improvement, especially during the mid-winter months. The symptoms became more severe in June, 1917, with the appearance of tenesmus with blood and mucus in the stools. In September the patient was confined to bed and had lost twenty pounds.

On examination the patient was rather pale with pinched facies. He had a reddish tongue with a few aphthous ulcers; teeth and tonsils negative; heart, lungs, liver and spleen negative. He was tender along the course of the large bowel and especially the descending colon. His mentality was clear and tendon reflexes normal. A few days later the patient was removed to the Presbyterian Hospital for treatment.

*Laboratory Findings.*—The urine was negative both chemically and microscopically. The feces showed blood, mucus and undigested material, no marked odor, no ameba or parasitic ova; abundance of Balantidia coli, six to twenty to a field.

The proctoscopic examination disclosed ulcers, varying in size from 5 mm. to 5 cm. in diameter, some shallow and not injected at the edges, and others larger and more injected, indurated and undermined.

The stomach analysis showed free $HCl_{10}$; total acids, 30; ferments diminished; slight excess of mucus; no occult blood.

The blood was 70 % hemoglobin; red cells 4,100.000; white cells 7,400; eosinophiles 2 %.

*Treatment.*—The patient was put to bed and given a diet of milk, eggs, scraped beef, cereals, and soft toast. He was able to take at the be-

ginning 1,800 calories. Medical treatment consisted of one grain of emetin hypodermatically daily, one alcresta tablet three times daily. This treatment was continued for seven days with no diminution in the number of balantidia, frequency of stools nor any lessening of tenesmus. Ipecac treatment was discontinued and the patient given drachm doses of bismuth subnitrate three times daily and the bowels were irrigated once daily with one to five thousand quinine solution. As there was only slight improvement at the end of a week, the quinine irrigations were replaced by irrigations of thirty grains of tannic acid to a quart of boiled water, which in ten days gave lessened tenesmus, blood and mucus, and frequency of stools. The food intake was gradually increased to 2,600 calories.

At the end of five weeks the number of Balantidia in the stools was markedly diminished and there was a six-pound gain in weight and the patient returned to his home in the country. Up to the present time there has been no return of bloody stools, but he has had periodical attacks of diarrhea with always marked increase in the number of Balantidii.

In 1918, the patient was given several rectal injections of a one to five thousand solution of Auratium dye, but this had no appreciable effect in eradicating the organisms. Recent proctoscopic examination showed no remaining ulceration, but Balantidia are still plentiful in the feces.

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## DISCUSSION

*Dr. George M. Niles, Atlanta, Ga.*—I was called into a case of this kind recently. It was a young man, a farmer, of rather meager circumstances and a little below the average intelligence. This man had bloody, painful diarrhea, and when they examined his stools they found a multitude of ballantidium coli and a few amebae in each stool. They were uncertain as to what caused the trouble. Emerson and others claim that ballantidium coli are common, but that they are innocuous and do not cause trouble. I was talking to a gastroenterologist last night, and he told me that up to date there have been only about 170 cases reported in all and the mortality was about 30 per cent. in these. But I will give you my experience along therapeutic lines with this man. We were undecided whether it was the many ballantidia or the few amebae that caused the trouble. We gave him a half grain injection of emetin every other day and two alcresta tablets three times a day. In ten days he was better and the pathologists found no amebae in his stools, but the ballantidium were as plentiful as ever. So we started on another tack. We gave him subgallate of bismuth, a teaspoonful night and morning; we gave him three injections of straight kerosene oil and a preparation containing two parts of tannic acid and one part of opium to be taken in a little water. This relieved him so much that he went home claiming he felt better. He has been back two or three times. He has occasional outbreaks of the diarrhea with tenesmus, but he has not intelligence to take proper care of himself, so he still hangs on.

*Dr. J. H. Eastland, Mineral Wells, Tex.*—For the last twelve years we have made routine stool examination of all patients that have come under our care. In the feces examination we have found the protozoa quite a bit more common than is given by the doctor in his discussion. In our first work of this kind some twelve years ago we became convinced that ballantidium coli had some pathological import, and on looking up the literature and questioning various men it has become a fad with us to pay special attention to this intestinal parasite. Living in a health resort town where these chronic cases are common, we had unusual opportunities to judge these cases. I think if in making routine examination of the stool one would give a purgative the night before and then not save the first stool, but the second, the semi-fluid stool is desired, one would find a great many more of these parasites. Then if a one-sixth power lens is used in examining with a dark field illumination, you would find many more than if you just look in the open field. The character of these stools is pale yellow, semi-flocculent. The visibility is very poor in these stools; sometimes you may have to dilute them with water. You can always tell these ballantidium coli patients when they come to see you by the color, the general lassitude, the desire to do something but the inability to carry on, the tenderness over the intestines and meteorism whether they have constipation or diarrhea. They do not all have a diarrhea present by any means. Some will be constipated and if you question them you will find a history of diarrhea in the past. They also have an inability to digest starches and sweets. They do better on broiled steak and milk and concentrated foods. These patients do not stand purgation; it weakens them and they will be sick for two or three days after a good purge; but they will stand old-fashioned castor oil better; that brings down the mucus. I have tried everything I ever heard of. I have written to various men, too. I have seen probably a hundred such cases. I would have to consult my files to be sure. Have had thirty cases in the last year and a half. Have found albuminuria present in a number of cases; also have had cases with diagnosis of pelvic abscess. They are extremely resistant to treatment; however, some have yielded.

*Dr. Sidney K. Simon, New Orleans*—I have had occasion to review the subject matter of

ballantidium coli infection recently and have gone over all the available literature and all authors state that the disease is excessively rare, and as far as I know the number of published cases is not over 175. Therefore, Dr. Eastland's observation covering one hundred cases is certainly a most notable one.

The disease, while its history dates back a great number of years, has not been overlooked and has been found by most observers, even in tropical countries, to be exceedingly rare. The only case I have ever seen was one reported by Drs. Bel and Couret in New Orleans a few years ago. Nevertheless, I have had my optics wide open looking for not only the free forms, but also the encysted forms of the organism, both of which are so extremely characteristic that they can not be mistaken for any other protozoa. The negative organism measures 200 microns and are ciliated. They burrow through the mucosa into the submucosa of the bowel wall, where they form nests of foci of infection and eventually a fistulous tract is formed leading into the free lumen of the bowel. We do not possess a specific drug for the infection, as Dr. Nisbet has stated. Emetin and ipecac have proven of doubtful value. Intestinal flushings are necessarily disappointing because the disease is not confined to the mucous membrane of the bowel, but the seat of the disease, or focus of infection, is in the submucosa.

*Dr. W. O. Nisbet (closing).*—I, like Dr. Simon, would be very glad, indeed, to have a full report from Dr. Eastland's large number of cases, because no other observer has found this infection so abundantly as far as I can learn from American literature. I am glad to know that Dr. Simon is getting out his record, because this is one form of dysentery that we should know more about. The presence of blood and mucus in the stool is common in this infection, and I think all authors agree that there are not many cases that do not show blood and mucus.

I am sorry that Dr. Barrett is not here to give us some report of his studies of the organism.

## ILEO-COLITIS*

By N. C. Womack, M.D.,
Jackson, Miss.

Ileo-colitis, as referred to in this paper, is an acute inflammatory process involving portions of the ileum and colon. Its etiology is always bacterial, which, for the purposes of this discussion, are the various forms of the dysentery bacillus, supposedly about fifteen in number, gas bacilli, which are always present even though the other forms are given as the causative agent, streptococci, and rarely, bacillus pyocyaneus. Conditions predisposing are, first, age usually from six months to four years, improper diet, bad hygenic surroundings and any condition producing a low resistance. The symptoms are diarrhea, fever, toxemia, loss of weight, vomiting, and a varying degree of acidosis. Diarrhea will show from ten to twenty or more stools in twenty-four hours and macroscopically will show mucus, blood and an albuminous fluid composed of blood plasma and cells. The fever is of a septic type ranging from 100 to 104, depending upon the amount and degree of toxemia. The toxemia is usually marked from the beginning, depending upon the amount of absorption from the inflamed bowel and the amount of kidney involvement. In cases where pyelitis or pyelonephritis is marked, the symptoms are not unlike the uremic attacks in older persons and in those cases terminating fatally are often preceded by uremic convulsions. Loss of weight is due to stopping the intake of food or the inability of the stomach to retain same, and the enormous loss of body fluids via the bowel. Vomiting is not a constant nor a distinguishing symptom. It is usually brought on by the administration of substances which disturb the digestion, improper feeding and medication. Acidosis is a result of the disturbance of the alkali status by the loss of body fluids and the toxemia present, but is not an important factor within itself.

*Pathological Anatomy.*—Lesions in the bowel vary from a slight turgescence or swelling of the mucosa to a pseudo membrane involving exrteme areas. The mesenteric lymph glands are always involved, especially the aortic and ileac groups, which are in direct communication with the lymph glands of the kidney.

*Complications.*—The most important is pyelitis, due to the colon bacillus, which is a gas-producing organism. At times one is at a loss to know which is the primary infection, so constant is the kidney involvement. In 1915 I began a routine examination for pyelitis of all urines in children and was immediately struck with the universal occurrence of pyelitis in all cases of ileo-colitis. Urines obtained within a

*Read in Section on Pediatrics, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

few hours of the onset of the disease, in one instance within two hours, invariably showed evidences of pyelitis due to the colon bacillus. Since that time I can not recall a single instance where a diagnosis of ileo-colitis was made that the examination of the urine failed to give a laboratory diagnosis of pyelitis. In all cases the laboratory work was performed by the Mississippi Hygienic Laboratory or the National Pathological Laboratory of Chicago. I wish to make the point that pyelitis is the most important single factor in the disease and cases are saved or lost to the extent that the pyelitis s successfully or unsuccessfully treated. Upon the improvement of the kidney the condition immediately assumes a more favorable prognosis and in my experience the bowel condition immediately comes under control by reason of the higher resistance set up in the patient. To establish properly the importance of the bowel trouble, *per se*, I would place it third as to the cause of death, with pyelitis first and starvation second. I wish further to make a point of the case presented for treatment. The baby may have a history of an attack of ileo-colitis last summer, or the summer before, or even three summers ago, in which the mother dates the present trouble to an attack of ileo-colitis with the statement that it has never been entirely well since that time; that upon the slightest indiscretion in diet the bowels move several times with slight fever and vomiting, which condition is usually relieved by a purgative followed by a restricted diet. Or, the case may present the above symptoms with anuria, swelling of the extremities, face and all the symptoms of a chronic Bright's disease. A culture of a sterile specimen of this urine will show the colon bacillus in large quantities and treatment directed towards relieving the pyelitis will first relieve the symptoms of Bright's disease, and secondarily, cure the bowel trouble. I have had so many of these cases with the history identical that when a case is presented the diagnosis can be anticipated.

*Treatment.* — Treatment is directed along three major lines. First, treatment of the pyelitis; second, feeding; and third, treatment of ileo-colitis. The pyelitis should be treated by making an autogenous vaccine and giving, in large and rapidly increasing doses, depending upon the reaction. Large amounts of water and hexamethylen in large doses with an acid urine are indicated.

*Feeding.*—In feeding every effort should be made to approach the caloric demand of the patient. This can only be done by selecting a diet that will be taken care of in the digestive tract and by forced feeding at regular intervals. I will attempt to describe the routine diet as used in the institution with which I am connected. Our results are so far very gratifying. Wheat flour is boiled for fifteen hours in a gunny sack and is then baked until it is thoroughly dry. The outside layer containing the bran and protein is cut away and the inside pulverized. A heaping teaspoonful of this is added to four ounces of soda water, sweetened with evaporated milk and fed to the baby with a spoon every three hours. If any quantity is vomited, an estimated equal quantity is given again. In forty-eight to ninety-six hours the stool loses its mucus and blood and as a rule becomes dark and possesses a good deal of body. No forms of protein, elixirs or wines are given. No enemas, irrigations of any kind are used. They not only do harm but cause the greatest agony to the patient. Soda water is given in certain amounts at regular intervals until the urine becomes alkaline; then plain boiled water is substituted.

The medical treatment should be symptomatic. If there is marked prostation, frequent squirting stools, calomel in doses from 1/24 to 1/48 grains and morphia in doses from 1/50 to 1/125 grains should be given by mouth every three hours until the bowel quiets down from its continual spasm. Splinting a spastic bowel carries as much rational as splinting a broken arm.

As a summary, I would say that ileo-colitis is mainly due to a gas-producing bacteria that, in my opinion, is an attenuated or malignant form of the colon bacillus. Second, that there is always an attending pyelitis in which the colon bacillus in great numbers is found and that this pyelitis may ante-date, and certainly is the immediate complication of, ileo-colitis, and assumes the major roll from the stand-

point of the cause of death. Third, in the treatment of ileo-colitis, first attention should be paid to the kidney. Fourth, forced feeding of a selected carbohydrate diet with plenty of water should be given. And fifth, all forms of rectal irrigations or alimentation should be strictly interdicted on the ground that they not only do no good, but are distinctly harmful.

Discussion follows paper of Dr. Harper, page 409.

## TREATMENT OF ENTERO-COLITIS IN INFANCY*

By W. W. Harper, M.D.,
Selma, Ala.

To treat entero-colitis successfully, one must make a distinction between the cases due to the gas bacillus and those due to the B. dysenteriae.

"Group 1.—Shiga.
"Group 2.—Park and Hiss.
"Group 3.—Flexner.
"Group 4.—Harris."

As the gas bacillus thrives only on a carbohydrate diet, this infection is best combated by withholding carbohydrates and giving proteins. On the other hand, carbohydrates furnish media not favorable to the growth of the B. dysenteric group and is the food of preference in the early stages of B. dysenteric infection. After a few days, proteins are gradually added to the diet. However, there are cases due to the B. dysenteriae which do better from the beginning on a protein diet.

Again, one should remember that in entero-colitis there will be cases in which the infection is principally in the lower ileum, while in others the lower colon bears the frontal attack. In the former, owing to the rich lymphatic supply, there is early and profound toxemia, rapid desiccation of the tissues, and a marked tendency to acidosis. Examination of the urine often reveals a severe nephritis.

Stool examination shows an absence of the lactic acid bacilli. These are the natural intestinal flora and are the baby's best ally. Their absence indicates that the intestinal canal has surrendered to the invading bacteria.

The indications for treatment are:

1. Prompt cleaning of the intestinal canal by catharsis and enema.
2. Withdrawal of all food for 24 to 48 hours.
3. Sowing intestinal canal with virile strains of lactic acid bacilli.
4. An abundance of water by
   (a) Mouth
   (b) Rectum
   (c) Hypodermoclysis
5. Free administration of alkalies and if acidosis threatens, the use of carbohydrates.
6. Adopting measures to prevent urinary suppression.
7. Early return to the breast or bottle.

As an initial purge, the writer prefers castor oil. If the first dose is vomited, a second dose is given at once, and if this is vomited, a third dose is given. From the three doses sufficient oil will be retained to act. A soda enema (two teaspoonfuls of soda bicarbonate to a quart of warm water) is given every six hours for the first 24 to 48 hours. These enemas not only clear the bowels of foul feces, but they furnish water and alkalies to the tissues. All food is withdrawn at once and water forced—the minimum amount of water to equal the amount of milk taken in health. To encourage the drinking of water, it may be given as iced tea, lemonade or orangeade sweetened with saccharin, one tablet to the pint. If the baby refuses to take the fluids, or if there is marked nausea or emesis, the fluid should be supplied by hypodermoclysis, giving 6 to 8 ounces every 6 to 8 hours to an infant six months old. Sterile tap water is rapidly absorbed, is the least irritating to the kidneys in its elimination, and all in all is the most satisfactory solution to use. Should acetone appear in the urine indicating an impending acidosis, the solution should contain 1 per cent citrate and 2 per cent glucose. The sites of election for the hypodermoclysis are the axillae, the buttocks, and the thigh. Avoid the tissue of the abdominal walls, as injections there render the abdominal muscles so painful that the patient will not use them to expel

*Read in Section on Pediatrics, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13 1919.

gas. As a consequence, the abdomen becomes very much distended.

Another, but less preferable, method of introducing fluid is through the stomach and duodenal tube. Still another, but the least satisfactory, method is by proctoclysis. The intravenous and peritoneal methods require special technic and are not practical in the majority of cases.

As soon as the castor oil is out of the stomach, give a lactic acid bacillus tablet in sweetened water every two hours. These should be continued until stools are normal. As acidosis is the greatest danger in this type of infection the urine should be kept alkaline with bicarbonate of soda, or soda citrate, five to ten grains every two hours to a child six months old. It is rarely necessary to continue the alkali longer than forty-eight hours. As soda bicarbonate is irritating to the stomach, Where the stomach refuses to retain it, it should be administered well diluted. soda citrate may be used as a substitute. As soda bicarbonate is changed by boiling to a carbonate which is a tissue irritant, it should be replaced with soda citrate when a sterile alkaline solution is needed for subcutaneous injection.

If the baby is on the breast, nursing is resumed at the end of 24 to 48 hours. The directions are to nurse one minute from each breast every four hours, to be preceded with lime and plain water. If all goes well as shown by falling temperature, lessened nausea, fewer stools with more consistence and changing color from green to yellow, the orders are to increase the nursing time one minute a day until the full nursing time is reached. If the infection is due to the gas bacillus, the baby is given lactic acid milk or protein milk before each nursing and this replaces the lime and plain water. If the infection is due to the B. dysteneriae, the nursing is preceded with a lactose-barley solution, varying in strength from two teaspoonsful each to two tabespoonsful each to the pint of water.

If the baby is bottle fed, the same treatment is carried out except as to nursing. Although carbohydrates are plainly contraindicated in gas bacillus infections, they must be given in threatened acidosis, as evidenced by acetone in the urine, cherry-red lips and hyperpnea.

Toxic nephritis with impending anuria is best combated with hot baths, hot packs and warm soda flushes of the colon.

For restlessness, give chloral by enema or morphin by needle. As a stimulant, atropin in fairly large doses has given the writer the best results.

Every now and then one will meet a case of profound vasomotor paralysis which can be pulled together with an intravenous injection of adrenalin.

Where the stools are large, frequent and watery, opium is often a life-saver. It should not be given to prevent elimination, but to check osmosis into the intestinal canal. If the stomach will retain it, give paregoric by mouth, but for quick action use morphine by hypo.

When the infection is mainly confined to the colon as evidenced by blood, jelly-like mucus and tenesmus, the above treatment is carried out with some modifications. After the initial purge, paregoric is given to relieve pain and to diminish the frequency of stools. Give enema only once a day as frequent enemas irritate the bowel and disturb the patient. For tenesmus and to hasten the cure, nothing has served the writer so well as an enema of silver nitrate solution ½ to 1 per cent in distilled water. The technic is as follows: the bowels having been flushed with sterile tap water, 8 ounces of silver solution is allowed to run into the colon through a large catheter. While the patient is straining to pass this back, the mucosa of the rectum is painted with silver nitrate 12 per cent. The whole painted area being neutralized by allowing a strong solution of sodium chloride to flow through a rectal catheter. This gives marked relief.

Intestinal antiseptics and astringents are mentioned only to be condemned. Their only function is to upset an already badly upset gastro-intestinal canal.

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## DISCUSSION

Papers of Drs. Womack and Harper.

*Dr. L. W. Elias, Asheville, N. C.*—I like to contrast summer diarrhea with a disease like diphtheria. You give antitoxin in diphtheria and treat the disease, also the patient to a large extent, but the patient can largely be neglected. With summer diarrhea we do not know very much how to treat the disease, but the patient

has got to be taken care of. We treat the patient absolutely in summer diarrhea. We do not influence the disease very much more than we influence typhoid fever. We are treating a patient with a disease that runs more or less its course uninfluenced by any of our efforts.

Rest is one of the most important things in treating summer diarrhea, and probably the thing that is most neglected. We can secure rest; that is where I think opium has its chief function, rest of the bowel and rest to the patient. As much as possible let baths and enemas, and your feedings and medication, whatever you do, come in bunches and give the patient rest between times. You can wear out a well patient much less a sick one. Fresh air; with that I would include coolness. I try to have these babies sent to the mountains where it is not so hot, and coolness to these little patients is an important factor in enabling them to get well. A little point worth remembering, easy to carry out in some places, is the use of an electric fan on the baby.

Then a third point is food. Some of us did not know except from our ancestors how typhoid fever was treated at first. You could not give typhoid patients water and they died of thirst. A little later on they gave milk and a little later they gave them some more, and now they feed typhoid fever patients a liberal diet.

*Dr. J. B. Sidbury, Wilmington, N. C.*—I believe that ileo-colitis and entero-colitis indicate very definite specific therapy. There are certain things that ought to be done. These things can be summarized briefly as, first, lactic acid milk. I think in many of these cases in which the Shaega bacillus is found the sugar treatment can be used with advantage, but we have had very few such cases of entero-colitis. It has been the fermentation type of diarrhea and that type needs the protein therapy, and not a high sugar content. It is nearly as much a specific for entero-colitis as antitoxin is for diphtheria. After the food proposition has been settled we should think about hypodermoclysis. The child has been losing water; he has been vomiting; he has been having diarrhea, and to give him water by mouth or by rectum is not infrequently a waste of valuable time. Furnish the water by hypodermoclysis. In a case that is very bad, give saline solution either intraperitoneally or intravenously, and it will greatly help many of these cases. In other cases which show signs of acidosis 5 per cent glucose and 4 per cent soda bicarbonate given intravenously every 8 to 12 hours for two or three days, from 100 to 300 c. c. will act as a life saver. All of these cases should have soda to the point of neutralization of the urine.

*Dr. W. A. Mulherin, Augusta, Ga.*—Pyelitis not infrequently occurs as a complication or a sequela, but in no sense can it be considered a symptom of ileo-colitis.

Dr. Elias mentioned heat and stagnant air as an etiological factor. I think they are not only very important causative factors, but contribute in no little measure to aggrevate and intensify an already existing ileo-colitis. I have seen this exemplified in our Children's Hospital at Augusta, Ga. For the last two years we have had in our wards ceiling fans during the summer months, and our results have been most gratifying in preventing and successfully treating such cases.

As to treatment, a plentiful intake of water, proper feeding, very little medicine, used symptomatically, not impirically, will save more babies' lives than any special line of treatment. The necessity for a generous supply of water to the tissues should be stressed. It not only helps to prevent toxemia, but is the logical way to treat toxemia when it already exists. It likewise prevents dehydration of tissues, which I consider the most important factor in producing acidosis.

The feeding proposition in such cases is most interesting. Some physicians will tell you that they would as soon give their little patients poison as to feed them protein milk. Other physicians will say that starch and sugar are contraindicated because they aggravate the bowel condition, as shown by the production of more frequent stools.

Some two or three years ago, in keeping with Dr. John Lovett Morse's idea, I had all stools in ileo-colitis cases, in my private and hospital practice, cultured to see if the gas or non-gas-forming organisms were present. If gas-forming organisms were present I gave protein milk; if non-gas-forming organisms were present, I fed carbohydrates. My results were excellent. I felt quite strongly that the solution of feeding such cases had now been solved.

Shortly after I was severely shaken in such conviction, after telling a mother to give her baby protein milk. Her baby had ileo-colitis; culture of stool showed gas-forming organisms. The mother was bent on giving sweetened condensed milk and I mentioned to her that if she did she would probably kill her baby. She proceeded to give the condensed milk and the baby got well. Two or three such experiences led me to discontinue culturing stools, as an index to the proper feeding.

In spite of the adverse opinions as to the propriety of feeding protein milk to such cases, I must confess that Finkelstein's idea appeals to me as being most logical, and that I use it more or less as a routine measure; and, except in cases with decided toxemia, I obtain uniformly good results.

*Dr. Oliver W. Hill, Knoxville, Tenn.*—One of the speakers referred to nephritis being present in most cases. I would like to ask him to explain in the discussion whether he means a true nephritis or not. We all know that when a patient has a very high temperature there will

probably be a shower of casts and some albumen in the urine, but that does not mean the patient has a true nephritis. We do have pyelitis in most cases, but not a nephritis.

With reference to Dr. Elias' electric fan, I believe he is in error. It is all right to keep the patient cool and if the ward or room is small and you can not get fresh air, keep the air in circulation if you possibly can or put these patients out of doors instead of keeping them in the house, and they will get fresh air, which is more valuable than all the electric fans you can use.

Dr. Sidbury spoke of using hypodermoclysis. The majority of cases with entero-colitis do not lose so much fluid. After the first acute onset of vomiting it is a slow process of toxemia and the acidosis is a marked indication. After the child has been sick for three or four days the acidosis is one of the most difficult things to combat. I believe in the beginning most of you can give sodium citrate. You can give it until you get an alkaline urine and use sodium citrate from the beginning or use bicarbonate of soda readily and allow them to drink water freely. You can give them a large amount of fluid without albumen; at the same time without hypodermoclysis or proctoclysis. You can use alkaline therapy if you use lactic acid bacillus, which I always use. It is very foolish to start lactic acid milk or lactic acid in sweetened water in milk. I do not give milk for at least thirty-six hours, but if you are doing either you should use alkaline therapy at the same time to prevent acidosis which will be encouraged by the acidity. Also I believe in investigating the kidneys to see what is taking place.

*Dr. I. W. Faison, Charlotte, N. C.*—In different parts of the country we have different conditions to contend with. I have had my cases looked after by a bacteriologist and we do not find the gas bacillus. We have not found the gas bacillus in more than two cases in two or three years. Therefore, I have stuck to the carbohydrate feedings, using well cooked cereals with a teaspoonful of granulated sugar with each feeding. By following this plan of treatment my efforts have been attended with success. I do not give any protein milk nor would I allow a doctor to give a patient of mine protein milk in the onset, but later I know it is often given.

I believe in nitrate of silver both by the mouth and by rectum. I have never in my life seen a better and safer remedy in the materia medica than nitrate of silver for diseased mucous membranes. If my throat becomes red and sore and hurts me this afternoon, I go to a throat man and have him touch it with nitrate of silver; tomorrow morning my throat is well. When I have children with ileo-colitis plus much blood in the stools, I use nitrate of silver from one-tenth to one-eighth of a grain every six hours. I never give more than one grain and give ten doses six hours apart. If there is much colitis and blood appears in the stools, I wash out the colon with a half gallon of sterile water and inject into the colon nitrate of silver, a dram to the pint, and in the majority of cases by tomorrow morning the blood stops. That has been my experience and my results are as good as I could expect.

*Dr. L. T. Royster, Norfolk, Va.*—I have cultured a large number of these cases every year, and in my city I have yet to find the gas bacillus. I can not say there is no case of gas bacillus infection because I have not cultured every case. The past summer we had an overwhelming outbreak; we had frequently as many as forty or fifty cases a day, and nobody can do very much with that large number of cases. A routine with us is, if the bowels have not been sufficiently cleaned out, to give a dose of castor oil. If the diarrhea is watery we let that alone. I depend upon carbohydrates in the beginning. I do not give milk or any protein until the stool is blood-free. I try not to give it until it is pus-free. I give cereal gruel with milk sugar, sometimes only milk sugar for the first twenty-four hours, then cereal gruel with milk sugar, and if the children are ten months old or more I give them toast, bread and cereal to eat and cut out everything except the fluids. I do not use bowel irrigations except rarely because they do not go very high up. When you have ileo-colitis, if you irrigate the lower six inches of the bowel you are not doing much for the ileo-colitis. Sometimes there is an accumulation in the lower bowel which is the cause of the toxemia. My cases do better on carbohydrate treatment than they do on anything else. I have not hesitated during the past two years, where the cases came to me late, to use intraperitoneal injections, and they have been life-savers in many instances.

*Dr. Womack (closing).*—These two papers and the discussions on them show how little we know about ileo-colitis and how much we need to know. There has been developed no plan which has met with universal approbation. Practically every man has had something new to say about it. I know it has been taught for years that we should not give protein in gas-producing infection. I came from a country (Mississippi) where in four days 150 cases broke out. The cases I reported were almost all of the epidemic type. It is rather sad that we have no definite idea of true colitis.

Regarding the plan I have worked out, all I can say to you is to try it, especially you men who come from the far South. Try it once. Forget all your books. Of course you need not tell me the colon bacillus is present; you will see the abdomen distended with gas and the urine loaded with it. There is always a gas-producing infection. No matter what other kind of infection you have, there is always a gas bacillus infection which one can demonstrate.

In our treatment of these cases, if we use simple methods and more common sense we will get along better. If we use plenty of fluids, giving a careful amount of food to the needs of the patient according to age and weight and force feed the patient every three hours, you will find these patients will get along well. Nourishment is one of the principal things.

Look out for kidney involvement. Dr. Hill said pyelitis was some time present. It is always present. I have never seen a case in which it was not present. After determining the presence of pyelitis then every effort is made to clear up the kidney. I realize this is not in line with the usual treatment and that it is hard to break away from the established custom.

With reference to the use of nitrate of silver, you could observe the mucus, you would see a red, raw surface with no effect other than possibly if, after putting nitrate of silver into the bowels, more irritation.

Do not irrigate the rectum. Feed the patients, look after the urine, and give them plenty of fluids.

*Dr. Harper* (*closing.*)—In reply to Dr. Hill, I am not a pathologist. When I find all sorts of casts in the urine, with a large amount of albumen, I am disposed to believe there is inflammation of the kidney.

In my section of the country two years ago we made a bacteriological examination of the stools of children and we found 40 per cent of them were cases of gas bacillus infection.

As to nitrate of silver, a week ago last Saturday I was called in consultation in a neighboring county to see a case of colitis and the doctor had not arrived. The child was twenty-seven months of age. Every fifteen minutes this child sat on the vessel and strained and strained for several minutes at a time. I protested to the family. I sat in the room an hour waiting for the doctor, and every fifteen minutes the child would jump out of bed and cry. The doctor having arrived, I suggested the injection of a solution of nitrate of silver. He consented to it. I used a weak solution and the next morning the mother told me that the child had only to get up twice during the night, and one week later I called her on the 'phone and she said the doctor was giving the baby apples and eggs, and probably wondering why it was not having stomach-ache after it.

# TROPICAL DISEASES AND PUBLIC HEALTH

## THE AFTERMATH OF MALARIA CONTROL IN EXTRA CANTONMENT AREAS*

BY J. A. LEPRINCE,
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In order thoroughly to protect Army and Naval forces in cantonments, and also labor engaged in war supply work, large areas averaging about a mile wide were established around cantonments, cantonment towns and war industry plants in Southern states for purposes of malaria control. Mosquito breeding areas in these zones were eliminated so far as practicable by drainage, and streams and wet ditches were trained and treated with oil. These areas were termed extra cantonment zones and consisted of forty-three separate areas in fifteen Southern states. General sanitation control measures, as well as malaria control, were stressed in these localities. Malaria control measures were carried out in a total area of over 1,200 square miles, and the preventive measures against other diseases extended over a much larger area. The total military, naval and civil population protected included about two and a half million people, and the cost per acre of the whole drainage project, which included the drainage of many miles of extensive heavily timbered swamps, was $1.61 per acre, including a year's maintenance. The local communities where the work was done voluntarily subscribed about $400,000 toward this undertaking.

Of the 43 communities where anti-malaria work was undertaken, 30 have continued malaria control measures since peace was declared, and four more contemplate doing so. This means that a larger area in the malaria belt will be controlled than all other similar areas combined in the period previous to the war.

In support of the campaign, the areas in Mississippi stand out in strong contrast with communities of certain other states.

The city and county health officers and chambers of commerce of the Mississippi Gulf Coast area from Biloxi west to Gulfport, as well as those at Jackson and Hattiesburg, Miss., by their active support, enabled the drainage operations to proceed rapidly and effectively.

The business interests of Jackson, Miss., and the Gulf Coast towns mentioned considered the proposed measures as a sound business investment and have already begun to receive interest on the investment. At Jackson, Miss., a prominent, rapidly growing railroad center, a remarkable reduction of malaria has been recorded and labor there is now much more reliable and efficient than formerly, which makes the labor situation of that town attractive to incoming new industries.

At Biloxi and Gulfport, production of Anopheles is being kept at a minimum, the chambers of commerce and business interests appear to take as much interest in health matters as professional sanitarians, and the hotels had more guests last summer than ever before. Of course the business men saw the wisdom of advertising the many permanent health improvements that were accomplished.

The anti-mosquito campaign at Little Rock, Ark., was so big a success that the public generally became personally interested in various other sanitary improvements even to the introduction of numbers of thorough-bred cows, thus assuring a larger and better milk supply for the welfare of the children.

The general report of health officers and sanitary engineers engaged in extra cantonment sanitation was that the sudden absence of mosquitoes created a very favorable impression among the public, caused them to think more of the possibility of preventing diseases other than malaria, and that the chambers of commerce and city business interests came to see the wisdom of making proper sanitary appropriations and supporting local officers and administrations in doing so.

*Read before Conference on Malaria (National Malaria Committee), Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

The press comment was most favorable and of big assistance in increasing the public sentiment for better and more permanent satisfactory health measures. These conditions frequently obtained at those towns where it was known that the cantonments were to be of a temporary character. Many cantonments have been demolished, but the improved sanitation continues.

Hundreds of thousands of young men, many from highly malarious districts, have had the opportunity to note the drainage operations and malaria control measures being carried out, and have felt the benefits thereof. It is possible that these same men, now in civi life, will be of large assistance to city and county health officers in the near future in helping to mould public opinion in the right direction where such support is very much needed.

Many traveling salesmen and business men, as well as relatives of the boys in camp, have visited the cantonment towns and spoken of the decrease in mosquito prevalence. The writer, who made inspections of the drainage operations in many Southern cantonment areas, has heard on the trains much public comment on the anti-mosquito work at various cantonment towns, and frequently the question, "Why can't it be done in our home town?" As our biggest problem in sanitation today, all over our country, is to determine the best and quickest method of getting the public to desire and demand that which the sanitarian knows is essential for it to have, then with regard to malaria control we may say that public interest and attention is beginning to turn in the right direction.

The President of the Chamber of Commerce of a prominent Southern city told me a few weeks ago that before visiting his son at the Army camp he thought "so-called mosquito control was all imaginary," but that now he hopes to induce his organization to support the county health officer and county commissioners until his Chamber of Commerce can boast that all villages and towns in his county were free of malaria and the mosquito pest. His idea was perfectly sound and practical—and it is to be hoped that among this audience are persons with enough interest in the public welfare to spread this news to the business men of other counties. This is a real function and duty of the physician in relation to state malaria problems, to obtain the active interest and co-operation of energetic public-spirited business men. No one is better qualified to get that support than the family physician.

During the period of the war a large number of engineers were given training in anti-malaria control measures, and in addition many competent men were trained as foremen of field operations. Much was learned regarding ditching with dynamite instead of more expensive hand labor and other new methods of control developed which will be of future use. Many medical men in army life, who would otherwise not have had the opportunity, have seen the construction work and observed the results of practical malaria control. Some of them who have since become county health officers at once applied the lessons learned.

The writer believes that bringing thousands and thousands of men from non-malaria districts and keeping them free from malaria while living in the heart of the malaria belt, is the best part of the control measures attained. These men have seen the South—have found out by personal experience that malaria is unnecessary and can be controlled at a reasonable cost.

Many of them will be connected with manufacturing, business and banking interests of the states beyond the malaria belt, where manufacturing interests are concentrated. Travel and active service have broadened these men and they will understand what is meant when the state health officers, commercial organizations and banking interests of the malaria belt co-ordinate efforts and insist on attacking the malaria problem on the best practical and economical basis.

The business interests of the North will be quick to see that if we reduce malaria in the South by 100,000 or 1,000,000 or more cases, that just so much more earning capacity (now dormant) will be created. It will mean just so much more

money earned daily. The Northern manufacturer will have an increased market for his products and the Northern laborer will prosper. It is high time that the representatives of the Northern states comprehend that this improved health problem of the South is closely related to business interests of Northern states, and that malaria should be considered not as a sectional but as a national problem.

Local funds for malaria control should be supplemented by county and state funds, and where essential by Federal appropriations. The big problem of Southern health officers today is to determine the best method of obtaining national financial assistance through the support of labor and business interests of the manufacturing states who will benefit so much by the anti-malaria action taken. A good starting point would be in the chambers of commerce in the cities of their own state.

If the farming, labor and business interests of your state are to reap the benefits of the additional uncompensated work the health officer desires to take up and accomplish, then they are entitled and it is their duty to do their share of work as indicated by the state health officer.

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## DISCUSSION

*Dr. A. J. Warren, Raleigh, N. C.*—I wish to ask a question or two of Mr. LePrince: first, in the cities along the Gulf Coast where Mr. LePrince has obtained such excellent results, what serious difficulty, if any, did the salt marsh mosquitoes present in the final results obtained; and second, what percentage of the people in those towns were infected with malaria?

My reason for asking these questions is that when I consulted with the engineer in charge of field operations relative to the choice of towns on or near the Carolina coast, he was of the opinion that the influx of salt marsh mosquitoes would have a very untoward influence upon the people relative to the success of the demonstration. And in the towns situated from fifty to one hundred miles inland there was raised the question of whether or not the malarial incidence in these towns was great enough to justify the demonstration.

I should like to know just what percentage of people must be infected to justify the expenditure of the necessary funds required in the control of towns selected and just how far inland salt marsh mosquitoes migrate.

*Mr. H. W. Van Hovenberg, Texarkana, Ark.*—I do not know why it would be impracticable to demonstrate malaria control in a coastal town. The problem of eradication of anopheles there would be similar to work already done in cities down along the coast and away from the seaboard. I believe the work of the Public Health Service at Newport News, Norfolk and Wilmington justifies the statement that it is practicable to demonstrate malaria control in a sea-coast city. Of course, there will be the problem of influx of culex in either the coastal town or in the interior, but in our work we are fighting the anopheles only.

*Dr. James A. Hayne, Columbia, S. C.*—It is not so much a question of getting rid of the malaria in the coast towns as of the fact that they do not get rid of the mosquito. To the general public the mosquito is a mosquito; they do not stop to count the spots on the wings, and when they find more mosquitoes there after you get through than before you started, they do not get very enthusiastic about the work. The scientific man who knows that the mosquito is not the anopheles and can prove that it is not, knows that the malaria has been eliminated. They always have the mosquitoes in the coast towns and you can understand that even in Atlantic City, where perhaps more work has been done than in any other place, last summer they had a perfect plague, and this in spite of all efforts at prevention. It will be almost impossible to accomplish the removal of mosquitoes from the coast towns.

*Dr. J. C. Geiger, U. S. Public Health Service.*—Two things that Mr. LePrince has brought up are of particular importance, namely, the increased interest in malaria control work and the necessity of first obtaining and holding the interest of the general public in the extra-cantonment zones. In Little Rock, Ark., they recently appropriated about $25,000 for mosquito control. The reduction of malaria morbidity and mosquitoes was so great in the extra-cantonment zone, Little Rock, that all business interests there insisted on the expenditure of the money necessary for its continuance. When you bring a commercial aspect to the destruction of the mosquito, it aids materially in the work of malaria control. This was demonstrated last summer when I was in charge of the work of mosquito control in the Yosemite Valley, California. In the Valley they told us mosquitoes were annoyingly present from the first of April to about July 15. Visitors to the Valley cut short their visits proportionally to the annoyances they were subjected to by the mosquito breeding there. From the fact that we were able to control mosquito production in the Yosemite Valley, it was estimated that we saved to the park authorities at least a hundred thousand ($100,000.00) dollars in tourist money at a cost of about twenty-five hundred ($2,500.00) dollars.

*Dr. C. W. Garrison, Little Rock, Ark.*—In Little Rock we have a mayor who is entirely in accord with malaria control, but who thought it was not necessary to continue our appropriation throughout the winter, and announced that it would be discontinued the first of November. I immediately got in touch with some influential men and the Chamber of Commerce, and have since been advised that the work will not be discontinued. An appropriation has now been made sufficient to carry on the work for another year. The public watch closely for mosquitoes. They do not care

for the fact that a certain type of mosquito is not dangerous and that another type transmits malaria, but when they put their money into a proposition they like comfort to go with it and they want the mosquitoes eradicated so that they may sit on their porches without being molested.

*Dr. John A. Ferrell, New York, N. Y.*—An adequately educated public is essential to the solution of the malaria problem in the South. Various methods for educating the public have been employed. My experience and observation convince me that a clear-cut demonstration, about the results of which there is more or less uniformly favorable opinion, offers the most satisfactory educational method. Once such a demonstration is made, the people who are fully familiar with it can be relied upon to supply reasonable funds for the maintenance and extension of the work.

In reference to marsh mosquitoes, my information is that their flight approximates, under favorable conditions, about forty miles, whereas the anopheles mosquitoes have a flight range of less than a mile, and frequently not more than a quarter of a mile. In view of the fact that the public is not yet fully informed as to the distinction between a mosquito as a pest and a mosquito as a transmitter of malaria, we should, in selecting locations for demonstrations, avoid areas in which the marsh mosquito will be a factor. After having gained a foothold in control measures in localities where conditions are favorable, we should then be prepared to take up the work in less favorable areas, areas, for example, in which the marsh mosquito as a pest will be encountered. By proceeding along these lines, we should rapidly win the confidence of the public and of the legislative bodies, Federal, state and local, and in time we may expect to have ample funds for the broad extension of measures for the control of malaria.

*Dr. Graham E. Henson, Jacksonville, Fla.*—It is well known that all of us interested in the control of malaria may be divided into two classes: one believing that the most practical method in most sections, or all sections, is by mosquito control; the other believing that the more practical and less expensive method would be to control the disease by sterilization of the human carriers. Now, in so far as Florida is concerned, and I think the same would hold true of certain sections of Louisiana and Georgia and other states, I can not make myself believe that it is practicable to try to control malaria by mosquito control work. On the other hand, I can not help but feel that it is practicable to control it by the sterilization of the gamete carriers. I wonder if we ever stop to realize the fact that a gamete carrier is a reflection on the physician who treated the case?

*Dr. H. R. Carter, Baltimore, Md.*—In all sanitary measures, not only the sanitation for control of malaria, the first question is that of cost. If you pay a dollar for less than one hundred cents of benefit, it is bad sanitation as well as bad business. In the work that Mr. LePrince has alluded to that was done during the war the question of cost hardly came in. My service had to do with malaria control in the extra-cantonment sanitation. We did not throw money away. We probably gained much for the civilian population, but in the extra-cantonment work money was spent more freely than would have been advised for the civilian population. We demonstrated that anywhere, no matter where, we could control malaria by mosquito control. This protection was of scientific interest but not of sanitary interest, because we paid more for it than would be justified by a civilian community. Thirty-four out of forty-three places where the sanitation has been done are either continuing it or are going to continue it, and that is pretty good evidence that in that number of places the locality received more of value than the money expended. The fact, then, that seventeen-twentieths of the towns were content with this economic sanitation, I count a triumph for economic sanitation.

Another thing is the increase of this work. The first attempt to control malaria in the United States was made almost simultaneously at Roanoke Rapids, N. C., and Electric Mills, Miss., in 1917, small places, and there was very little spent. Now, here are thirty-four places undertaking malaria control and the average of these is probably three times as large as the two we began with. At present we have many places that want work done and we have not men enough to supervise them. Now, the difficulty is to supply the skilled supervision. We have the money ready. Unquestionably the control of malaria is on the increase.

There are two kinds of mosquitoes that we are concerned with: one the disease carriers and the others the pestiferous ones. As malariologists we are only concerned with the disease carriers, but, as Dr. Garrison said, the public likes to eliminate all mosquitoes. As a practical man, I think in the control of the anopheles around a community, you must take in also the control of the other mosquitoes, chiefly culex quinquefasciatus in the South and the culex pipiens in this section. This does not add materially to the cost, but does add to the comfort of the people. Their flight is probably not over two or three hundred yards. They are domestic mosquitoes and you certainly gain much in reputation and the support of the public in eliminating them. The salt marsh mosquito is different and its control should not be undertaken unless the people who put up the money understand what they have to do. It can not be done by a small community, but must be carried on by the whole state. Speaking for Aedes sollicitans, I think I had the misfortune to report the first wide flight of these mosquitoes, which was eighteen miles, but Headlee has reported forty-three mile flights. No community could be expected to drain salt marshes as much as that. It is not of sanitary importance, but practically I would advise that the domestic mosquitoes always be considered along with malarial control. They operate close in and it is not much additional expense to eliminate them. I suppose it was the salt water mosquito that your engineer was afraid of.

*Dr. H. A. Taylor, International Health Board, Little Rock, Ark.*—In some localities it is not only necessary to control mosquitoes from a disease standpoint, but from other standpoints as well. It has been shown that as soon as the nat-

ural breeding territory in a town is under control the anopheles are very likely to breed in artificial containers. It is therefore necessary to control them both. I think the cost will not be much increased and the benefit to the public will be great.

*Dr. Charles E. Low, Wilmington, N. C.*—We have had some experience in Wilmington, a city of about 40,000 population, and we have spent about $60,000 in the last two years. I mention this to show that it is possible to raise considerable sums of money if you keep your people interested.

We were able, by searching, to find the anopheles breeding in very unsuspected places. When they can not find the desired conditions in which to breed, on account of control by oil or something else, they will find water somewhere, if not in their ideal place, in a water barrel or somewhere else. I remember once going to the woods and finding an old water barrel which had been there for a long time, which was full of culex and some anopheles. It never should have been left there. There was a control in the locality, but it had not reached to the barrel and in this barrel the mosquitoes were breeding very plentifully. The near-by stream was under control and the mosquitoes had located a new place for breeding.

*Mr. H. W. Van Hovenberg, Texarkana, Ark.*—I wish to emphasize that we should not confuse our malaria control work with the culex problem in the ordinary city. In our work along the St. Louis Southwestern Railway we ask the cities to accept the burden of ridding the town of culex, while we take charge of the control of malaria through elimination of the anopheles.

I would not feel justified in spending railway money in any town in getting rid of the culex except as incidental to our anopheles work. We have been successful in getting cities to appoint sanitary inspectors and in organizing Boy Scouts and others in fighting the culex mosquito.

*Mr. LePrince (closing).*—In selecting the places for demonstrations we have considered, so far as we could, the question of what we wanted the demonstration to bring about, and the difficulties we should encounter. Any one who has undertaken extensive mosquito work knows that many unforeseen difficulties are going to appear. He also finds out that the public of the district where the demonstration is undertaken expects him to overcome every one of these difficulties. The unforeseen always happens in mosquito control work. Other things being the same, if we had twenty places to choose from, it would be advisable to select the place, or one of the places, that had the highest sick rate from malaria. The people in other communities would naturally think if we could get rid of malaria in the places with a high rate it would be much easier for them to get rid of theirs, having a relatively low rate.

The question of complicating the problem with the salt marsh sea coast mosquito was considered. If you conduct a campaign within flight range of the anopheles breeding places, the public will get the impression that you are going to get rid of the chief mosquito nuisance. Most of the people in a mosquito-ridden district are interested more in getting rid of that mosquito pest than they are in getting rid of malaria. That is the public viewpoint. The public press, too, frequently helps to give the public the impression that all mosquitoes are going to be eliminated by the campaign. At the end of the season your public may be very much disappointed if any pestiferous but harmless mosquitoes are present.

The question then comes up of the appropriation for continuing the work another season. If the city authorities are told by the public that the work has failed or the public does not want it continued, you have a very small chance of continuing your needed malaria work. If you have a very successful demonstration of the malaria control work just beyond the flight range of the Aedes sollicitans, the people in the community affected by sollicitans get more and more as time goes on to want work done in their district. You must state clearly that you are not going to get rid of the salt marsh mosquito, that that pest will and must go on until the area affected is thickly enough settled to justify the drainage of the extensive salt marsh areas.

Regarding the question of the flight range that was brought up, it has already been covered.

As to Gulfport and the Mississippi coastal area, I can say that we had nothing to do with selecting that place as a demonstration area. It was necessary as a war measure. Near the naval reservation most of the residents had malaria when the camp was opened up. Of the first seven or eight naval officers going to the camp, four had malaria. Regarding the possibility of getting rid of malaria, I would like to state that with an average force of 1,800 men kept at that camp, a constantly changing force for over two years, only one single case of malaria was contracted. It was a most difficult area to control, a place where most people would say, "The work can not be done." I am very proud to state that the people of that district made the largest per capita contribution for malaria control of any place in the United States. If you go there today you will not contract malaria, although it had the reputation before the war of being a very malarial community. The printed report of the work accomplished there can be obtained from the Chamber of Commerce of either Biloxi or Gulfport, Miss., and is well worth careful reading and study.

The time has arrived when we should stop using the word mosquito as we do and refer to certain definite groups of mosquitoes. Let us consider the mosquito as a bird. If we could reduce all of our birds down to the size of the mosquito and color them a drab color, the public would not recognize one from the other. We have many dozen different kinds of mosquitoes. There are only a few that we are interested in, but to the public a mosquito is simply a mosquito. The flight of the yellow fever mosquito is probably one hundred yards or less. The flight of the malaria mosquito is absolutely different from that of other mosquitoes. When we are asked how far the anopheles or malaria mosquito will travel, we must say it depends upon which one of the malaria mosquitoes we are speaking of. We have to come down to the individual.

We have in the Eastern states three different

kinds of malaria conveying mosquitoes. The one in which we are most interested, because it is responsible for most of our malaria, is the Anopheles quadrimaculatus. We have made careful observations of the flight of that mosquito and you can get reprints of the flight observation studies from the office of the Surgeon-General which will give complete information. With normal production they do not often appear to range much beyond a quarter of a mile from the breeding area. We found many such areas where, in examining all houses (every square inch of the walls) and everywhere offering suitable shelter, we did not find them in houses much farther away from the breeding place. With more prolific breeding areas present, we find the adults of Anopheles quadrimaculatus half a mile away. Under the most prolific breeding conditions we do not find them more than one and one-quarter miles away. We must remember that in the few cases where they have been reported farther away, we had thousands of acres of rich anopheles producing territory and many acres of territory where small production areas might have been unnoticed. This relation holds good: the more the anopheles breeds the greater the flight range up to the limits indicated. For practical purposes we might state that the flight beyond the one-mile limit is not of much importance. The half-mile is the usual range considered for control operations at present.

I have done very little work with the Anopheles crucians and think the average flight of Anopheles punctipennis has not yet been carefully observed.

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## THE CONTROL OF MALARIA FOR A RAILROAD SYSTEM, BASED ON THE EXPERIENCE OF THE ST. LOUIS SOUTHWESTERN DURING 1917, 1918, 1919*

By H. W. Van Hovenberg,
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Texarkana, Ark.

Practically all railroads from Texas to the Atlantic Seaboard run through or touch highly malarial districts. These railroads draw their labor from the same sections. A great part of this labor comes from small towns along the lines or from the farms. Malaria is a rural rather than an urban disease. The railroads obviously draw much of their labor from highly malarial sections. The relative efficiency of this labor might be measured by the relative malarial indexes over the different sections of the railroads. Since the cost of labor is the greatest expense in maintaining railroads, there should be, and there is, a direct relation between the cost of railway maintenance and the malarial index of the country through which the railroads operate.

The turnover of labor on railroads is enormous. Recruiting labor is a difficult and expensive proposition. Generally, no thought is given to the efficiency of this recruited labor. Hospital admission slips and time checks are continually being issued to men who have been only a few days in railway service, and more of the same inefficient labor is recruited and carried over the lines to fill their places. If it is possible to provide that the railroad labor recruited from towns along the lines be generally free of malaria, the control of malaria by the railroads in these towns will be an investment of the highest order. This is particularly true of the cities and towns where railway shops are located.

Any comprehensive plan for control of malaria along railroads should provide for protection of as many employes as is economically sound, and should be developed so that new laborers will be recruited from towns that have been freed from the devitalizing chills and fever. The railroads can justify their financial support of malaria work in cities and towns through having a more efficient labor supply to draw on, through protection of employes and their families, and through the increased prosperity of the towns.

If the revenue of a railroad is derived chiefly from hauling lumber from mills along its line, its prosperity is dependent on the output of these mills. The output of lumber mills is dependent on local labor. This labor is now at a premium and generally is far from efficient, due chiefly to malaria. It is obvious that the railroad will be benefited in two ways from malaria control in the lumber towns: first, from increased output of the mills and the corresponding increase in freight; and, again, from the increased efficiency of the labor it recruits from the mill towns. The example of the mill town may be used in describing the gain that will come to any

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railroad from malaria control in a community that has been rid of chills and fever. Aside from the financial gain to the railroads the demonstration of malaria control in cities and towns is a step toward the goal we are all striving for, namely, the elimination of malaria from this country. Railroads will surely find it a good investment to support projects for reclamation and colonization of lands that need only the hand of the engineer to rid them of malaria and to make many thousands of acres of abandoned farm lands again prosperous.

Railroads can justify the financial support of control methods for protection of employes directly, since this saves the enormous hospital expenditures for treatment of malarial patients; stops the demoralization of working forces by reason of men and bosses going on sick list; prevents the extravagant turnover of labor; maintains contented and, therefore, more efficient men; and prevents the costly delay in maintenance and construction work by keeping a full quota of men on the job.

Railroads are, in many ways, responsible for the prevalence of malaria in towns along their lines. They impound streams for water supplies, within or adjacent to municipalities. They maintain borrow pits that do not drain. They discharge enormous quantities of waste water from shops without proper disposal. They maintain stock water tanks within city limits and permit fire barrels on platforms to be unscreened. Railroads import laborers from malarious countries, such as Mexico, Italy and Greece, and bring these infected laborers into our cities and towns. Railroad shops that employ great numbers of laborers are often poorly located because of the unsound policy of buying cheap land, land that is cheap because of proximity to malarial swamps.

Railroads, then, should be interested in general measures toward the eradication of malaria from the South, both as employers of labor and as agents ofttimes responsible for the propagation of malaria. So far as the responsibility of railroads toward the propagation of malaria goes, the remedy lies in avoiding, in the future, the mistakes in new railway construction and location that have given us the improperly drained borrow pit, the poorly located water supply ponds, swamp-surrounded railway shops, etc. Railroads should begin now to eliminate these bad conditions by proper steps during reconstruction and rebuilding.

From investigations that I have made of the hospital records of a number of railroad systems in the South, I find that, on an average, one-third of the medical admissions have been diagnosed as malaria. Probably one-third of the medical relief furnished at these hospitals may be charged to malaria. The hospitals are maintained either by the railroads or by the employes, or by both. In any case, a reduction of malaria among employes will decrease the hospital expense for both railroads and employes. I figure conservatively that it costs the railroads at least $50.00 for every hospital malaria patient, not including the cost of medical treatment while in the hospital. I think all railway managers will agree that the greatest loss through malaria to a railroad is occasioned by the large number of employes who continue at their work while infected with malaria, and who continue to draw their money for only a feeble portion of their energy. As an indication of how well known the tremendous loss to railroads is, I will say that the Federal manager of one of our largest transcontinental railway systems told me that it would be a paying investment if one case of malaria could be eliminated for every ten miles of track.

If, through the expenditure of a limited amount of money, the Southern railways can materially decrease the admission of malaria patients to their hospitals and can materially increase their chances of obtaining efficient labor from the cities and towns on which they draw; and, if they can materially increase the production of lumber, the prosperity of cities and the colonizing lands, now unproductive because of malaria, there is no question as to whether or not they can afford to adopt malaria control.

To plan intelligently for control of malaria on railroads, we should know from what department of a railroad the malaria patients are entering the hospital; there-

fore, it is necessary to make a survey of the hospital records. In case medical and surgical attendance is furnished by local surgeons, it will be necessary to advise with them along the line. In general, it has been found that 90 per cent of the malarial cases come from section men, extra gang men and shopmen, in about the following proportion:

Section men comprise about 20 per cent of employes and furnish 40 per cent of malaria.

Extra gangs comprise about 10 per cent of employes and furnish 25 per cent of malaria.

B. & B., water service and work trains comprise about 5 per cent of employes and furnish 15 per cent of malaria.

Shopmen comprise about 20 per cent of employes and furnish 10 per cent of malaria.

The per capita cost of protecting section men, extra gang men, shopmen, etc., will vary in each instance, depending on local conditions. In general use the following methods of control:

METHODS OF CONTROL

*Section Men*—

(a) Screen all houses owned by the railway.
(b) Furnish 16-mesh wire screen at cost to men owning own homes.
(c) Furnish quinin free of cost through operating department.
(d) Eliminate mosquito breeding areas by drainage or filling.
(e) Institute an educational campaign.

*B. & B., Water Service, Etc.*—

(This applies to extra gangs.)

(a) Screen all bunk cars immediately.
(b) Furnish quinin free of cost during proper season.
(c) Educate men in swatting of mosquitoes in cars.
(d) Spot outfit cars, where possible, in safe locality.
(e) Institute an educational campaign.

*Shopmen.* — Eliminate all anopheles breeding areas in the cities where shops are located by co-operating with local authorities in a general campaign. The railway may effect malaria control through its own forces and ask the cities to share in the expense, or the railway may donate to the campaign carried on by the cities. In the case of the shopmen, it will be found more economical to eliminate the mosquito than to adopt the other measures for control of malaria.

In selecting the cities or towns in which to inaugurate malaria control measures, we would first enlist co-operation in the cities where railway shops are located. The railroads should bear a substantial part of the cost of the work in the shop towns, since protection will not only be given to the shopmen and office employes, but to the families of those men as well; also, shop towns are usually division points from which labor is drawn for both shops and the entire railroad.

If advisable to seek co-operation with cities and towns other than where shops are located, we would naturally select communities having one large business enterprise, or a number of smaller but similar industrial activities. It will be found much easier to co-operate with the managers of industries who virtually control the towns in which their interests lie and, as a demonstration, these same business men will be quick to realize the financial benefit derived from malaria control work.

In planning with cities and towns, it should be made apparent that railroad financial aid in carrying on malaria control work is temporary and that the communities must gradually accept the burden of carrying on the work, so as to allow other communities to get the benefit of railway co-operation. After two or three seasons, the malaria work will be shown to be of such value to the communities that they will be willing to carry on the work as part of their civic activities. How well this plan has succeeded along the St. Louis Southwestern Railroad is shown in the table on the next page.

This table summarizes the cost to the St. Louis Southwestern Railway Company and to the cities for each year, exclusive of overhead, and is so tabulated that the ratio of the expenditures by the Railroad and the cities are shown in percentages for each year. Reference to the summary shows that the proportion of expense for actual field labor, tools, etc., borne by the Railway Company has decreased from 53 per cent in 1917 to 33 per cent in 1919. On the other hand, the cities furnished 47

per cent of the cost of field work in 1917 and increased their support to 67 per cent in 1919. Actually, the Railway Company spent less money in 1919 for field labor and supplies than it spent in 1918. Reference, particularly to the city of Tyler, will show the increased financial support obtained from that city, ranging from only 10 per cent in 1917 to 81 per cent in 1919.

SUMMARY

| | Expend. Excl'd'g Overhead | | Per Ct. Yearly Expense | | | |
|---|---|---|---|---|---|---|
| | St. L. S.-W. R'y | Cities, Mills and Individuals | St. L. S.-W. Ry | Cities, Mills and Individuals | Total Exp. Ex. Overhead | Per Ct. Increased |
| 1917 | $2,160 | $1,882 | 53 | 47 | $ 4,042 | |
| 1918 | 4,308 | 3,478 | 55 | 45 | 7,786 | 92 |
| 1919 | 3,588 | 7,302 | 33 | 67 | 10,890 | 40 |

| | Expenditures Exclusive of Overhead | | | |
|---|---|---|---|---|
| | St. L. S-W. R'y | Cities, Mills and Individuals | Per Ct. Total Exp St. L. S-W. R'y | Per Cent of Total Exp. Cities, Mills and Ind. |
| Pine Bluff— | | | | |
| 1917 | No work done in Pine Bluff this year. | | | |
| 1918 | $ 933 | * | 100 | * |
| 1919 | 270 | * | 100 | * |
| Texarkana— | | | | |
| 1917 | * | $1142 | * | 100 |
| 1918 | 1195 | 1400 | 46 | 54 |
| 1919 | 983 | 1800 | 35 | 65 |
| Mt. Pleasant— | | | | |
| 1917 | No work done in Mt. Pleasant this year. | | | |
| 1918 | 534 | * | 100 | * |
| 1919 | 1001 | 359 | 74 | 26 |
| Commerce— | | | | |
| 1917 | No work done in Commerce this year. | | | |
| 1918 | No work done in Commerce this year. | | | |
| 1919 | 550 | 300 | 65 | 35 |
| Tyler— | | | | |
| 1917 | 1240 | 140 | 90 | 10 |
| 1918 | 1262 | 716 | 64 | 36 |
| 1919 | 380 | 1614 | 19 | 81 |
| Wildhurst— | | | | |
| 1917 | 175 | 93 | 65 | 35 |
| 1918 | 4 | 215 | 2 | 98 |
| 1919 | 13 | 250 | 5 | 95 |
| Keltys— | | | | |
| 1917 | 227 | 60 | 79 | 21 |
| 1918 | 4 | 126 | 3 | 97 |
| 1919 | 5 | 650 | 1 | 99 |
| Lufkin— | | | | |
| 1917 | 518 | 447 | 54 | 46 |
| 1918 | 374 | 1021 | 27 | 73 |
| 1919 | 386 | 2329 | 14 | 86 |

*None

The following table summarizes the *per capita* costs of the 1919 work in the cities under control along the St. Louis Southwestern. These figures do not include the overhead expenses on the part of the railroad. They do include all actual field labor, tools, oil, transportation charges, salary of foremen, etc.:

| Location | Population Under Control | Total Cost, Excluding Overhead | Cost per Capita | Number of Railway Employes | Number of Employes and Families | Cost per Employe | Railway Family per Capita Cost |
|---|---|---|---|---|---|---|---|
| Pine Bluff | 5000 | $ 270 | $.055 | 900 | 3600 | $ .30 | $ .075 |
| Texarkana | 25000 | $2783 | .115 | 300 | 1200 | 3.28 | .82 |
| Mt. Pleasant | 5000 | 1360 | .275 | 150 | 600 | 6.72 | 1.68 |
| Tyler | 18000 | 1994 | .111 | 1500 | 6000 | .253 | .063 |
| Commerce | 6000 | 850 | .141 | 225 | 1000 | 2.44 | .55 |
| Lufkin | 6000 | 2715 | .452 | 50 | 200 | 7.72 | 1.93 |
| Keltys | 700 | 655 | .935 | | | | |
| Wildhurst | 600 | 263 | .44 | | | | |

A demonstration of the value of quinin in prophylactic doses has been carried on during the past season along with the eradication of the anopheles in the cities. This demonstration included the B. & B. department in Texas and about half of the B. & B. employes in Arkansas and Missouri, numbering about 250 men. In addition, quinin was supplied to the section foremen and laborers along 233 miles of track, 90 miles of which was in east Texas and the balance in Arkansas and Louisiana. The result of this demonstration is not available at this time, but will be published later. On the whole, our work among the B. & B. and section men has been handicapped by unusual conditions brought on during and following the war.

What work we have done over the St. Louis Southwestern System has been without aid whatsoever from state, county or city health authorities other than the endorsement by city health officers and local physicians of our program when presented to city officials for their consideration. We hope during another season, however, to enlist the co-operation of the several state health officers. With our time devoted entirely to field operations, we are unable to establish the keeping of health records in these cities. We would ask the state health department to co-operate with us in establishing the keeping of vital statistics in these cities and of soliciting the aid of local physicians in reporting of malaria and treating their patients in a more thorough manner.

Much stress is being laid by National and Regional railway officers on the "Safety First" movement. They are re-

warded with an ever decreasing number of accidents with each "Safety First" drive. "Safety-First" is a success both from a humanitarian standpoint and from the saving of enormous sums in personal injury payments. I have no doubt that malaria control on Southern railroads on the same scale and with the same warm endorsement of the operating officers would prove to be an even better investment for the railroads. The field is a wide one, the time opportune, and the economical value so apparent that the next few years should see the adoption of malaria control programs on all Southern railroads. The St. Louis Southwestern Railway is pleased to have been the pioneer among railroads, but will be more pleased to have been the means of encouraging other Southern railroads to begin malaria control work on a scale commensurate with the seriousness of the problem from the standpoint of efficient operation of railroads.

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## DISCUSSION

*Mr. J. A. LePrince, U. S. Public Health Service, Memphis, Tenn.*—I understand that the work done by the St. Louis Southwestern Railroad has resulted in other railroads looking into what their lines can do, and I understand that one of them has found that its direct loss from malaria last year was $60,000, which was just so much money thrown away. The Cotton Belt Railroad does not run through the most malarial section of the United States. There are other districts that are even more seriously affected. Many of our railroads are not beginning to get the paying freight business that they should have, because of the loss caused by malaria. I was glad to hear this paper read at this meeting, but think it most unfortunate that it could not have been read before a meeting of general managers and surgeons of Southern railroads, because it is through the surgeons of the railroads of the United States that this important matter can be brought to the attention of the general managers of the roads. It is not only the railroad in the malarial belt itself that suffers, but also all of the connecting lines which lose money through the malaria loss in the district the road goes through. I would call attention to the fact that the railroads of the South and throughout the United States suffer tremendously. I know of one railroad in another malarious country that used to have to give its employes a vacation of sixty days per year in order to keep them efficient. I think that the state health officers can co-operate with the railroads, help the railroads and in turn get a tremendous amount of benefit for their state in the way of malaria control.

A point of importance that has not been brought out is that this control of malaria by the railroads, if properly conducted and directed, is an important financial matter to them, and they should consider this work as important as their hospital work. The roads exist to make money on their investments. This preventive work will bring them enormous returns. Furthermore, they should select for this work the very best type of specially trained engineer they can get. They should consider the relative value of his services and pay him accordingly. Inefficient engineering work is very expensive work. I know of nothing which will give them better returns for their investment than good engineering work.

*Dr. C. W. Garrison, Little Rock, Ark.*—I should like to have a little information. In Pine Bluff the figures give a population of 600. I suppose that is the number affected. I should like to know if the doctor has information of the malaria incidence in that percentage of employes.

*Dr. H. R. Carter, U. S. Public Health Service, Baltimore, Md.*—The discussion of malaria is not essentially a medical problem. I mean that malaria, like every other health problem, is primarily a problem of the people who suffer from it, and it is a problem of the business man. At the last meeting we got the business men to attend the Association and tell of the benefits they had received. In North Carolina, in Louisiana, in Georgia and Virginia the physicians have not taken a broad enough view of malaria to control it properly. The business men have. It is with them a question of economy, whether they make by it. The first work done at Roanoke Rapids was done by the cotton mills. The manager stated in a letter to me that they did not undertake this as a business matter, but because they were sorry to see people so miserable; but that as business men they "had never received such enormous returns on any investment" they had made. They showed over 100 per cent the first year. The manager of the mills in Crossett wrote that they would have had to close their mills in 1917 but for the work done by Derivaux and Taylor. It had brought them more than 100 per cent each year. This railroad work was commenced in 1917 with this in view, and it was proposed to extend it as the railroads would take it up. As they find it pays they will take it up. It seems to me a wedge that will split far and wide.

I think the railroads in the next few years will conduct a very large fight, because they will get a very big interest—from 10 to 100 per cent. Another reason is that unintentionally railroads in the past have been spreading a large percentage of malaria. I think fully half the malaria in Virginia is caused by the railroads, by street car tracks, by barrow pits, faulty culverts and ditches. When the railroads are thoroughly interested they will cease to put in undrained culverts, and they can do a very large amount of preventive work to their own advantage.

*Dr. Graham E. Henson, Jacksonville, Fla.*—I can not help but feel that it is unfortunate that in this program the matter of the control of malaria by sterilization is only touched on in one paper, while our friends on the mosquito side

of the game have been given a great many more. If the railroad surgeons were properly educated in the matter of the treatment of their cases of malaria as they occur among railroad employes it could not help but result in a great gain for the railroads. I do not wish to throw any bombs into my friends, the railroad surgeons, and I fully realize the importance of the statement I am making, but I do not believe that 5 per cent of the railroad surgeons of today know how to treat malaria. It is especially unfortunate that, knowing the specific cause of malaria and having a specific treatment, that the formation of the gamete in the human host is ever allowed to occur. It is also very unfortunate that we can not adopt a standard method of treating our malarial infections. You can go into any little village, or any city, and though every man in the profession says he knows how to treat malaria, a very small percentage of doctors properly handle their cases. I do not wish to go into the control of gametes in the human host, but I do wish to emphasize that in my opinion more can be gained by educating, first, the public to the necessity of long-continued treatment when they are once infected with malaria and, secondly, that it is necessary to educate the surgeon in the treatment of malaria. Our Chairman has just stated that we should control the malaria, depending upon the community with which we are dealing. With all due respect to Colonel Carter, I wish to protest against that statement. While it is not practical in all sections of the country to try to control malaria by controlling mosquito production, it is practical in all sections of the country, regardless of the geographic location, to sterilize the human most, and I think such an attempt should be made.

*Dr. James A. Hayne, Columbia, S. C.*—It is better to maintain a fire-proof building and keep it fire-proof than to maintain a fire department to put out fires. In the communuities that have gotten free of malaria this can be appreciated. I live in a little place where the people used to have to leave about the first of April and not come back until the first of October. This malaria came from a swamp that has been drained in the last twelve years, and since then there has been no malaria. Up to the time of the draining of that swamp they took quinin, and took large amounts, but they also took malaria and chills, and they moved away. But now the place is free from malaria, the result of getting rid of the breeding place of the mosquitoes. This is an improvement that will remain forever, because the per capita cost of properly drained areas is not high. The upkeep of the continued sterilization of the human host is very high, and of the two I think I prefer the permanent improvement to the shorter sterilization of the human host.

*Dr. Graham E. Henson, Jacksonville, Fla.*—It is the rule that we should not take the floor more than once, but the gentleman has just made a statement to the effect that the sterilization of the human host is only transitory. I wish to protest against that. I believe in the elimination of the mosquito where it is practicable, but in certain places it is not practicable. Malaria was prevalent at Camp Johnston, and our method of sterilizing our cases as soon as they came in practically eliminated it. But nothing was said of that. As far as the expense of sterilization of the human host is concerned, it is a minimum. In the areas where it is not feasible to eliminate the mosquito, it is possible permanently to sterilize the human host, and it does not mean the constant administration of quinin. If the individuals who are gametes carriers are properly treated and the blood is made sterile, the continuance of malaria is just as impossible, regardless of prevalence of anopheles in the community, as if you had no anopheles. Again, the control of malaria does not only mean the sterilization of the human host after he has become a gamete carrier, but insofar as it concerns the medical profession, if he is treated properly he will never become a gamete carrier. Without going into a discussion of the evolution of the carrier, we know that the sexual forms never occur until the infection has been going on for at least ten to twelve days. If the patient is properly treated he will never become a carrier and I, therefore, maintain that in communities where the elimination of the mosquito is impracticable, more stress should be laid upon the sterilization of the human host. My reason for this is the fact that we have been laying not too much stress on mosquito control, but too little stress on the sterilization of the human host.

*Mr. Van Hovenberg (closing).*—I am glad there are so many here willing to take the floor in the discussion raised by Dr. Henson. I will simply tell him that, in the St. Louis Southwestern Railroad Hospital at Texarkana, we have adopted a standard treatment for malaria. We also had, during the past year, the service of a laboratory technician, supplied through the courtesy of the Public Health Service. This technician made blood smears of all patients entering the Hospital and proved microscopically that 75 per cent of the cases diagnosed as malaria by the doctors were correctly diagnosed. In 25 per cent. of the cases the organisms were not found on microscopical examination, owing possibly to the fact that some of the men had taken quinin before coming to the Hospital.

Standard hospital treatment has been adopted for use of local surgeons up and down the line, and we have stressed the necessity of taking quinin for a period of at least sixty days.

Replying to the question of Dr. Garrison regarding Pine Bluff, the city was unable to cooperate with the St. Louis Southwestern Railroad, so we began control of the section of Pine Bluff surrounding our railroad shops, in which about 65 per cent of our employes live. The other 35 per cent lived in Pine Bluff proper and out of our control area. The reduction of hospital admissions from Pine Bluff has been marked, the percentage now being about 15 per cent of what it was before we took up work there.

# RELATION OF DRAINAGE PROJECTS TO MALARIA CONTROL*

By Jere I. Herritage, C.E.,
Engineer, Drainage District No. 5, Washington County, North Carolina,
Jacksonville, N. C.

We can appreciate the importance of drainage when we consider the number and magnitude of land drainage projects that have been worked out during the past century and see the good they have done in sanitary conditions that made it possible for man to live in those swamps and marshes and raise products to help feed many millions.

The Fens of eastern England, comprising 700,000 acres of land, formerly inundated by the storm-tide of the North Sea and rivers which emptied their waters from the interior of the island upon them, are now dotted with thriving towns and traversed with railroads of national importance. The reclamation of these covered two centuries with discouragements that have rarely been exceeded, but this land is now a source of revenue amounting to not less than $30,000,000 per year.

The Dutch people have been looked upon in modern times as masters of the science. The drainage of Haarlem Lake, 42,300 acres, since 1839, is a striking example of their ability. Now 16,000 people inhabit this lake and the surrounding country has been financially improved and made sanitary.

Several million acres have been made both sanitary and productive in France and Italy.

Among the most brilliant early results in the control of malaria were those obtained by Gorgas in Panama. This was one of the most malaria infected regions known, having been called during the French occupation "The Frenchman's Grave," it being a common report that in the railroad between Panama and Colon every cross-tie represented a corpse of a laborer. This caused the French to be unsuccessful in their undertaking. When the United States undertook the project, although other methods were used as adjutants, the measure relied upon for the control of malaria was the abolition of the breeding places of anopheles by underground (tile) drainage wherever practicable. The result you know.

Tile drainage was begun in England about 1843 and extended to France, Germany and other countries of Europe, and to the United States from Scotland in 1848, at such prices that, as Mr. Johnson remarked, it "left a farmer without an excuse for wet land." From this method of drainage the world has received the greatest sanitary benefit. In 1858, Central Park, New York City, comprising 856 acres, was drained by this method and it is no longer considered, as it was before, a menace to the health of the city. Col. George E. Waring wrote a book on this subject called "For Profit and for Health."

The tile drainage movement traveled westward from New York into Ohio, Indiana and Illinois. Illinois, once known as the "Ague State," is now the second corn-growing state in the Union, and on its developed prairies malaria is almost unknown.

North Carolina, with about 4,000,000 acres of fertile soil too wet for cultivation without drainage, was left poor after the war between the states and could only resort to the hillsides, that were partly naturally drained, for her little farms. Here, with the helping hands of our physicians, she has been fighting the battle with malaria and the agents that carry it from these undeveloped fertile spots.

At last we awakened to the theory of the old man who, wishing to teach his wife a lesson, threw a rope across the house. He took one end and she the other to pull it off. Finding they could not get it off in that way, they decided to take the same end and the result taught them always to pull together. By a like theory, our General Assembly was induced, in 1909, to enact laws whereby a body of our people can come together and form a drainage district to promote the public health and welfare of the people and maintain it. From this, despite the great World War,

*Read by title before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

North Carolina is breaking all historical records in the speed with which this great work is progressing.

For example, take the great Albemarle swamp lying in Washington, Beaufort and Hyde Counties, which was partly dredged between Pine Town and Belhaven by J. W. Wilkerson about 1910. The 15,000 acres known as his purchase with other land, and the Eastern Carolina Home and Farm Association's 8,000 acres of land, with other lands at and around Wenona, begun in 1913, have now practically developed. There are about 75,000 acres being dredged and developed belonging to the Potter Farms Company, Inc., the Norfolk Southern Land Company, Inc., and many small tracts belonging to the surrounding inhabitants in this immediate vicinity. Also the Mattamuskeet Lake, in Hyde County, including the lands around its border, about 120,000 acres, has its pumping station, with many canals, and is looking forward to immediate development.

The plan of drainage is to lay out districts by the owners of the land coming together under, and in accordance with, the drainage laws of North Carolina. They appoint their viewing committees with engineers to lay out their plans of drainage and make their reports, including in their first, second and third series of answers:

1. Whether the proposed drainage is practicable or not;

2. Whether it will benefit the public health or any public highway or be conducive to the general welfare of the community; and

3. Whether the improvement proposed will benefit the land which they wish to benefit.

After the above report, commissioners are elected and they appoint a superintendent of construction to carry out the construction as proposed in the specifications attached to the viewing committee's report.

In the districts that have been developed, canals have been cut about one mile apart by floating dipper dredges, the canals leading into some outlet canal which disposes of its water by emptying into river or sound. The canals are usually about eight feet deep with a bottom width of ten to forty feet, or of such sizes as are calculated to carry off the run-off from the rainfall, on the territory to be drained, before it becomes a nuisance to the community. The fall in these canals ranges from eight inches to seven feet per mile. The land is then usually laid off into eighty-acre farms, with a frontage of a quarter of a mile bordering on one of these canals and reaching back one-half mile from the canal. The farmer then constructs a small lead ditch along his lower line leading into the canal and empties his laterals (some by tile and some by open ditches) into his lead ditch, making an independent drainage for his farm except the canals which belong to the district.

As these swamps were not inhabited prior to the drainage, we have no statistics of their past health, nor have we any accurately-kept record of the surrounding edges, but the doctors tell us that around these swamps the inhabitants were sorely afflicted with malaria and the health has been greatly improved since the development of the swamp land.

No one more than the engineers can appreciate the good effect of drainage to these lands in ridding them of mosquitoes. For after development he finds that he can walk or ride over these lands almost unmolested; and people live there in comfort and health, with their overflow wells of pure water, enjoying thrifty growing crops on their fertile land.

A few days ago I asked a man in drainage district No. 4, Washington County, around Wenona, if there were any malaria there. He answered, "Not much." Then I asked if there were any mosquitoes. He replied, "Not many." After talking to him I found what he meant by "not much" and "not many;" that when he started to move to his district he was advised by a friend not to come, for mosquitoes would nearly eat him up and he could not live there for malaria. He moved in, anyway, and finds that he and his family are enjoying better health and accumulating dollars with more comfort and less work than his friend who is on higher, but poorer land.

In undrained areas I find mosquitoes of the anopheles kind are breeding. Near these places I find malaria very prevalent

and hear of many cases of hemorrhagic fever.

While we find by the drainage that it has been made possible for these fertile swamps to be developed and made very profitable, and that men can live in them with a fair degree of health, there is still more that can be done for the extermination of malaria. The work that has been done was thought of for the purpose of agriculture and the benefit for health came through accident. We yet find in dry seasons that the water falls low in these canals and seems to seek a small and crooked channel in the bottom of the canals, leaving pockets or basins of water on the sides of the bed, with vegetation growing in them. It becomes more convenient for the farmer to begin his development and build his home near the canal, where he is near the mosquitoes that are likely to come from these basins. So let us make a small ditch within the large ditch and drain these pockets. This will not cost more than 25 cents per acre. Then let each farmer place at his home an overflowing well, which will be of unknown value to the comfort of his home and will furnish a fresh supply of water flowing down the small ditch to prevent any further breeding of mosquitoes. These ditches would stay open without much cost of maintenance where there is a firm soil and a fall of as much as three feet per mile. Where we find a sandy or loose soil and a sluggish current it would be necessary to clean these small ditches at least once a season, or concrete them, a more expensive but cheaper proposition in the end.

Now, hand in hand, let us put our thoughts, our money and our efforts together inviting the doctor, the law-maker, the engineer and the farmer, and all who are concerned, to lend us a helping hand to drain the 70,000,000 acres of swamp land in the United States and exterminate malaria, making healthy homes for many needy thousands. We can thus increase our revenues to startling amounts and feed many millions of people, and we may save to our home a life that is very dear to us and make it a place of comfort, health and happiness.

# SURGERY

## RAILWAY, INDUSTRIAL, GYNECOLOGICAL, OBSTETRICAL AND UROLOGICAL

### TECHNIC OF OPERATIONS UPON PERIPHERAL NERVES

BY C. C. COLEMAN, M.D., F.A.C.S.,
Richmond, Va.

The material for this paper was obtained from 132 peripheral nerve operations performed by the writer upon 102 patients at the U. S. General Hospitals No. 11, Cape May, N. J., and No. 41, Staten Island, N. Y.

The following table shows the number of operations upon the various nerves and the type of operative procedure:

TABLE OF OPERATIONS

| | Liberation | Suture | Transplantation |
|---|---|---|---|
| Median | 14 | 17 | 1 |
| Ulnar | 5 | 29 | 0 |
| Musculospiral | 5 | 12 | 0 |
| Sciatic | 3 | 14 | 0 |
| Internal Popliteal | 4 | 2 | 0 |
| External Popliteal | 3 | 11 | 2 |
| Posterior Tibial | 1 | 1 | 0 |
| Anterior Tibial | 0 | 2 | 0 |
| Internal Cutaneous | 3 | 3 | 0 |
| | 38 | 91 | 3 |

These operations were done some months after the injury, and in nearly all instances the nerve lesions resulted from a war projectile. Many of the cases were under observation several months before, and for an equal length of time after operation. In this series there were no deaths, and only two mild wound infections. End-result statistics are not available at this time, but will be reported in a later paper.

The surgical treatment of a nerve injury becomes necessary when the evidence of satisfactory regeneration of the nerve can not be obtained by a careful examination of the patient. This general statement as to the indications for operation is not intended to exclude immediate operation for the nerve injuries of civil life when it is evident that the nerve trunk has received severe structural damage or is completely divided.

The injury to the nerve may consist of partial or complete division, stretching, contusion and incarceration in scar tissue or callus. The site of the injury usually shows a neuromatous enlargement which may often be palpated through the overlying soft tissues. If the nerve is completely divided the neuroma of the proximal segment is generally much larger than that of the distal. Occasionally the distal segment of a divided nerve shows no enlargement whatever, and this is especially true in some cases of division of the musculospiral and of the median just above the wrist (Fig. 1). A common type of lesion is

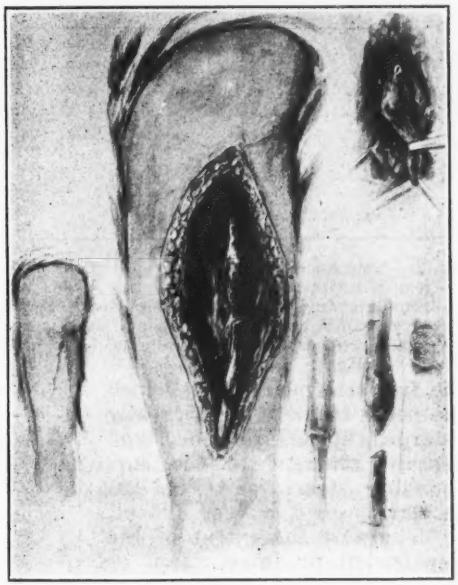

Fig. 1.—Sciatic lesion showing no neuroma of the distal segment. Drawing to right below shows funiculi at level of suture.

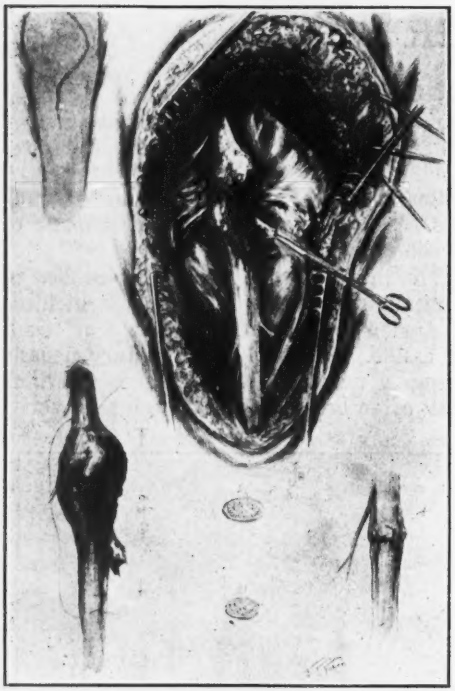

Fig. 2.—Note incision for exposure of high sciatic lesions. Upper left, dense scar tissue surrounding fusiform neuroma. Cross sections of proximal and distal segments show nerve bundles. Completed suture shown below and to the right.

the fusiform neuroma in which the nerve trunk is often greatly enlarged, fibrous, reddened, and densely adherent to the surrounding structures (Fig. 2). In such cases it is very difficult to determine the extent of the impairment or interruption of the axis-cylinders and equally as difficult to choose between liberation and excision of the neuroma with direct suture. Probably the most frequent source of confusion in the study of the indications for operation upon nerve injuries caused by projectiles is the recovery of many patients from complete paralysis after a number of months, without any form of operation.

A direct injury to the nerve by a projectile is not necessary to bring about immediate and complete paralysis. The pathology of the nerve thus paralyzed by the impact of a missile on the surrounding tissues or neighboring bone is not always clear. The forcible vibration of the nerve cord with the resulting hemorrhagic extravasation between the funiculi and secondary fibrous tissue formation are factors of undoubted importance.

The difficulties in reaching a decision to operate upon nerve injuries can be solved only by a knowledge of the anatomic distribution of peripheral nerves, an investigation of the motor, sensory and electrical phenomena, and a familiarity with the normal processes of nerve regeneration. These constitute the essential components of the minimum study of a patient with a peripheral nerve lesion.

The manner in which a nerve is injured is obviously of importance. A stab wound followed by immediate paralysis of a given nerve means partial or complete division, and exposure of the nerve is indicated without delay; whereas peripheral nerve paralysis resulting from a projectile may or may not be a spontaneously recoverable injury, and the indications for operation would depend upon demonstration of the fact that operative measures are essential to remove the obstructions to successful regeneration. Exposure of the injured nerve, without previous neurological study

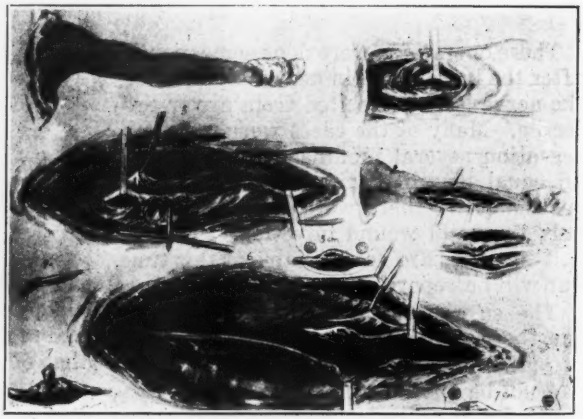

Fig. 3.—Suture of median and ulnar in forearm. Note dense scar and perforation of median neuroma by spicule of bone. 7 cm. defect of the ulnar overcome by shifting nerve from behind internal condyle.

and unless the trunk is found partially or completely divided, does not always supply the information necessary for intelligent guidance of the surgeon as to the type of operation the nerve requires. The surgical procedure upon the nerve itself is dependent entirely upon two main factors: first, the clinical findings and, to a lesser extent, the history of the case; and second, accurate interpretation of the pathology found when the nerve is exposed.

As a rule, operation for the nerve injuries of this series was not done until the wound had been healed for three months. If the bone has not been injured, and the wound heals promptly, operation should

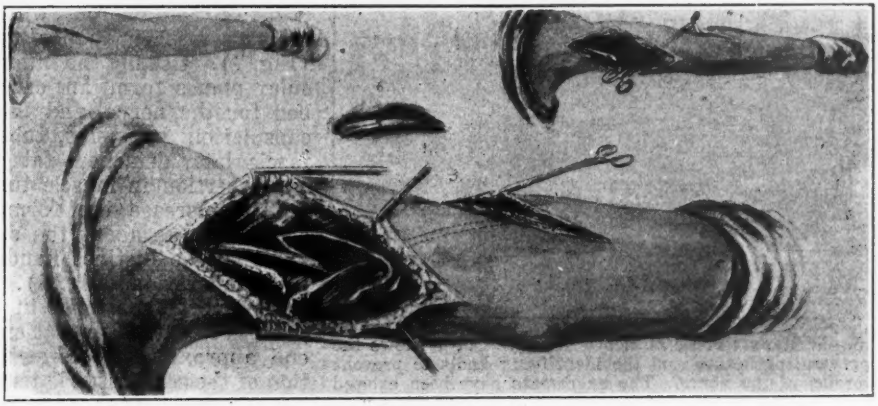

Fig. 4.—Transposition of the distal segment of the musculospiral between the biceps and brachialis to the internal surface of the arm in order to bridge over a long defect. Dotted line indicates course of distal segment of nerve under biceps to inner side of arm.

be done earlier. There should be no delay in applying surgical measures when the necessity for such measures has been demonstrated, provided the local infection has been removed. While good results may be obtained by operation many years after the nerve injury, the earlier the operation is performed the better the functional recovery. In some cases any time limit for operation must be disregarded because of severe pain in the nerve requiring prompt operation for its relief. The location of a nerve injury may be a factor in deciding for or against operation. Exposure of the median in the arm is a very much simpler and safer procedure than operating through scar tissue upon a partial lesion of the median below the elbow where it is deeply buried in muscles and gives off important branches.

Three types of operation are done for peripheral nerve injuries: (1) liberation of the nerve, or neurolysis; (2) suture; and (3) transplantation.

Liberation is indicated when the nerve is compressed by scar tissue or bound up in callus. It is beneficial only when the interference with nerve function is extraneural and can not possibly be of help to paralyzed nerves when the neuraxes are destroyed or obstructed by intraneural scar tissue. Definite estimates of the value of freeing an injured nerve from scar tissue are difficult to form, because of the partial nature of the lesion for which liberation is done, and the tendency of such lesions to spontaneous recovery. Liberation if unsuccessful should be followed by suture in three or four months. In many cases prompt results are obtained, and this is especially true when pain and irritative phenomena are the chief features of the patient's disability.

Suture is indicated when there is anatomical interruption of the nerve or intraneural obstruction by fibrous tissue without satisfactory signs of regeneration. In preparing a nerve for suture, all scar tissue must be completely removed and the healthy funiculi uncovered by serial sections made with a sharp knife. This may result in a considerable defect,

or extension of the joints of the extremity, which can generally be overcome by flexion combined with freeing the nerve for some distance above and below the lesion (Fig. 3). Gentle stretching of the peripheral segment to gain distance is permissible, and transposition of the nerve to a more direct course is especially valuable in the musculospiral, ulnar, and median (Fig. 4). Tension on the line of suture must be avoided. Much time is saved by first exposing the nerve trunk above and below in healthy tissue and continuing the dissection through the site of the injury. As soon as the nerve is exposed, a silk suture is placed in the sheath, followed by a similar identification knot in the same plane on the opposite side of the lesion to prevent torsion of the nerve and malapproximation of the bundles. One penetrating suture of catgut is used for all nerves except the sciatic, which requires two, and a sufficient number of fine epineural silk sutures are placed to secure accurate approximation of the sheath (Fig. 5).

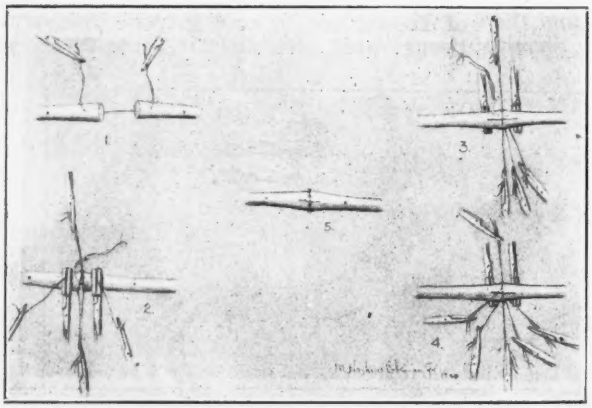


Fig. 5.—Writer's technic of nerve suture. Cut 1 shows the penetrating suture and the identifying knots to prevent torsion of the nerve. The neuromata have been excised to the level of healthy funiculi. Cut 2 shows approximation of segment by clamping the suture with rubber-covered mosquitoes at the points where it emerges from the nerve. This approximates the segments and permits a better exposure of the sheath and, therefore, more accurate suture than if the penetrating suture were first tied. All sutures are left long and clamped with mosquitoes. Cuts 3 and 4 show rotation of the nerve so as to expose the apposed sheaths of the opposite surface. Epineural sutures of fine silk are applied in the same way. Cut 5 shows suture of the sheath completed and the penetrating suture of fine catgut tied.

A subtotal neurorrhaphy, or suture of the interrupted nerve bundles with preservation of the healthy portion of the nerve, is often indicated, especially in injuries of the sciatic trunk. A direct suture is made of the damaged portion of the nerve with separation and looping of the healthy bundles (Fig. 6).

It may occasionally be necessary when the line of suture rests upon a bed of dense scar tissue to transplant a pedicled flap of fat and fascia to minimize the fibrous tissue formation about the nerve. In suture of the musculospiral over callus of the humerous, this procedure is of undoubted value (Fig. 7). Usually the intermuscular planes form an excellent bed for the nerve, and the encapsulation by veins, tubes of fascia lata, detached fat pads and insertion in muscle tunnels tend to increase the formation of scar tissue about the suture and may be distinct handicaps to regeneration (Fig. 8). The loss of nerve substance in some cases is so extensive that end-to-end approximation after resection of the scar tissue is impossible. In many of these cases the neuromata may be sutured together *a distance* with heavy silk with the limb in flexion. Gradual extension of the extremity so elongates the nerve that direct suture can be accomplished at a secondary operation.

Nerve transplantation is indicated when the segments of the divided nerve, after removal of the fibrous ends, can not be approximated without hurtful tension. The autogenous nerve graft taken from a superficial sensory nerve is the best material to fill in a defect in a motor or mixed nerve. The method of Huber by which a cable of several segments of a sensory nerve, generally the musculocutaneous of the leg, is transplanted into the defect, seems best to fulfill the histologic requirements for regeneration (Figs. 9 and 10).

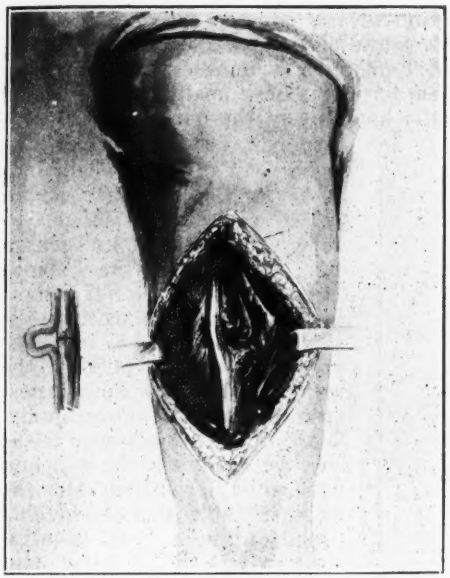

Fig. 6.—Note complete anatomical interruption of external popliteal constituent of sciatic and partial division of internal popliteal portion. Lateral neuromata on internal popliteal with bundle of funiculi along inner border of nerve intact. Suture to left shows approximation of external popliteal and damaged portion of internal popliteal with preservation and looping of the undamaged nerve bundles.

Animal nerves preserved in alcohol have been used with success for grafting, but the results do not seem so favorable as those obtained by the autogenous transplant. Theoretically it would seem best to use a sensory branch from the degenerated peripheral segment of the injured nerve, inasmuch as such a transplant has undergone the necessary histological preparation for conducting the neuraxes from the central segment. Bridging over a defect by connecting the segments with veins, arteries, tubes of fascia lata and cables of silk or catgut is an unsatisfactory procedure which often obstructs whatever chances there may be of spontaneous regeneration. In certain cases, transplantation of a nerve may later be followed by suture with advantage when the central end of the graft is permeated by axis-cylinders to a distance sufficient to permit approximation of the regenerated portion of the graft with the distal segment at a secondary operation. This technic was employed in one case of reoperation upon a median transplant in which the upper part of the graft was enlarged, and for a distance of 2 cm. the permeation of the graft by the downgrowing axis-cylinders could be demonstrated.

The results of transplantation are by no means so successful as those of suture, and it should not be employed except when end-to-end approximation and suture of the divided nerve is impossible.

Interruption of a nerve, such as the anterior tibial and posterior interosseus, at the point of division into terminal branches, is not suitable to any form of operation upon the nerve itself, and in such cases tendon transplantation gives good results. Tendon transplantations were done on two patients with posterior interosseous lesions to give extension of the thumb and fingers. The tendon of the extensor carpi radialis longior which was active was partially divided and inserted into the extensor poi-

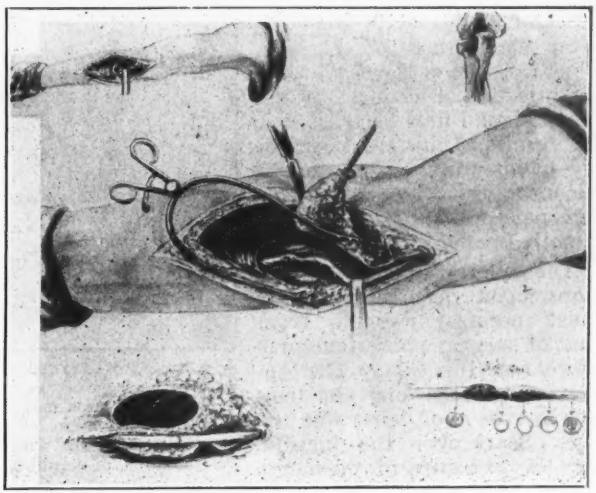

Fig. 7 shows the transplantation of a pedicled flap of fat and fascia to minimize the fibrous tissue formation about the sutured ulnar nerve. Note figure showing serial sections.

licis longus and extensor ossis metacarpi pollicis. The flexor carpi ulnaris tendon was inserted into the tendon of the common extensors. The results were satisfactory in both patients.

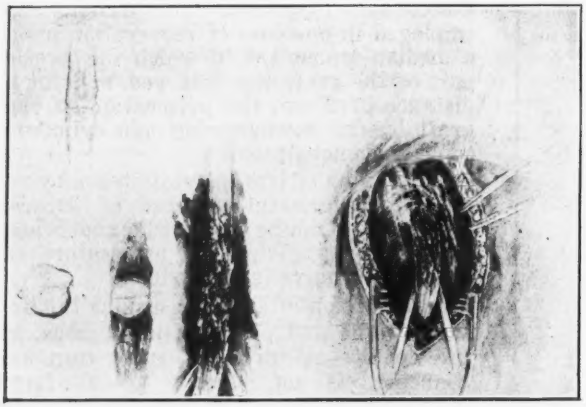

Fig. 8.—Appearance of nerve after primary liberation and insertion in a muscle-groove. Note dense fibrous tissue and fusiform neuroma which required excision at secondary operation. Patient had severe causalgia in the internal popliteal distribution.

Causalgia, first described by Weir Mitchell, may require resection and suture of the nerve as well as excision of the perivascular sympathetic plexuses after the method of Leriche. The liberation of the nerve with the injection of alcohol into the trunk should first be tried, but the results of this treatment in my hands were by no means encouraging. The median and internal popliteal are most frequently involved in severe pain.

The general technic of operations upon peripheral nerves must necessarily vary from that of surgery upon structures of coarser function. The operation is often long and tedious by reason of dense scar tissue. Scars over the incision for the exposure of the nerve should be excised, because the healing of such scars is frequently very unsatisfactory (Figs. 11 and 12). It is unnecessary to emphasize the importance of a dry field, tection of the exposed nerve by warm, wet, saline pads.

A tourniquet is unnecessary and may cause paralysis of a healthy nerve and a gentle handling of the nerve and the protendency to post - operative hematoma. Drainage is avoided by ligation of every oozing vessel. Dissection should be done with a sharp knife as a rule, although in the case of the ulnar just beneath the elbow joint one blade of a pair of scissors may be thrust into the groove, and by putting the nerve in slight tension, exposure may be made more rapidly. Dissections through scar tissue may be facilitated by continuous saline irrigation, but the uncontrollable slop outweights its advantages. Local anesthesia may be used in the shorter operations and is helpful in the study of nerve topography, but as a rule ether is to be preferred. A small, sterilized electrode from a single cell faradic battery or inductorium should always be at hand. It is often indispensible in operations upon

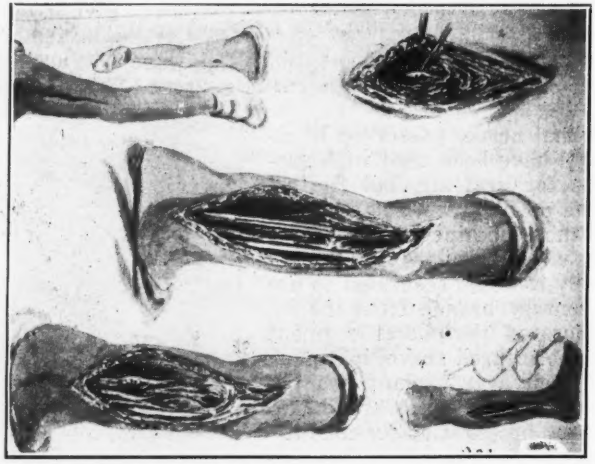

Fig. 9.—Shows transplantation from musculocutaneous of leg to long defect in median. Reoperation showed enlargement of proximal end of graft. Direct suture was done by using 2 cm. of proximal portion of graft, which permitted suture without tension. Lower cut to right shows method of handling transplant with fine sutures.

nerves with a partial lesion to outline and protect the healthy nerve bundles.

When mobilization of ankylosed joints and repair of ununited fractures were required in this series, these operations were generally done before the injury of the nerve was dealt with. However, there is no reason why the nerve and bone operation should not be done at the same sitting in the majority of cases if there is no infection. Bone shortening to allow nerve suture is permissible in the arm when the median and ulnar can not be sutured by flexion of the elbow with transplantation of the ulnar and shifting the median from beneath the pronator.

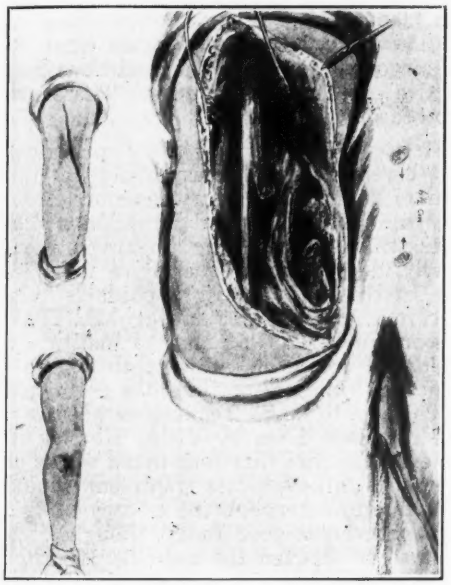

Fig. 10.—Transplantation of lateral sural to fill long defect in external popliteal at level of knee joint. The lateral sural in this case is larger than is usually found. Operations under local anesthesia.

A sufficient study of surgical repair of injured peripheral nerves has been made to reach a certain degree of standardization of procedure, and to discredit the bizarre unsurgical methods advocated a few years ago. Notably among these may be mentioned the turning over of flaps from the nerve to bridge defects, lateral transplantations between nerve bundles and nerve crossings. These procedures do not meet the requirements of nerve regeneration and often interpose a permanent obstacle to spontaneous recovery of function.

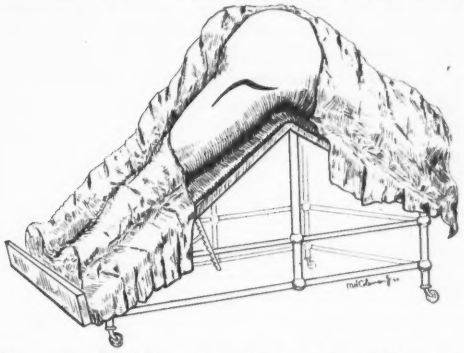

Fig. 12.—Position of patient, and incision for operations upon high sciatic injuries.

The immobilization of the limb by a plaster splint is regarded as an important feature of the dressing of nerve cases. The plaster splint gives rest to the part and promotes surgical repair of the wound, which is often extensive. The limb may be fixed at whatever angle seems necessary to prevent tension upon the sutured nerve. The later extension of a limb

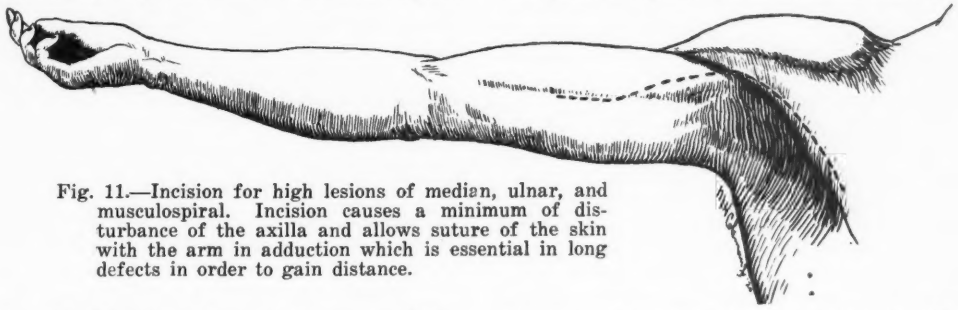

Fig. 11.—Incision for high lesions of median, ulnar, and musculospiral. Incision causes a minimum of disturbance of the axilla and allows suture of the skin with the arm in adduction which is essential in long defects in order to gain distance.

put up in flexion at the time of operation should be carefully done.

The prognosis of operation upon nerves has enormously improved by reason of a better conception of nerve regeneration, improved operative technic and more intelligent care of the patients after operation has been performed. Obviously a perfect regeneration of the nerve trunk would be functionally unsuccessful if fibrosis of the joints or muscles is not prevented by intelligent physio- and electro-therapy and the proper use of splints. The management of patients with peripheral nerve lesions should start with the injury and continue until functional recovery is complete, or until it becomes manifestly impossible for recovery to take place.

Discussion follows paper of Dr. Sachs, page 441.

## A FEW OF THE PROBLEMS IN NEUROLOGICAL SURGERY*

By Ernest Sachs, M.D., F.A.C.S.,
Professor of Neurological Surgery, Washington University School of Medicine,
St. Louis, Mo.

In going over my hospital records of the past three years, I find that we have studied between two hundred and thirty and two hundred and forty neurosurgical cases and have operated upon about one hundred and seventy-five. These cases have been so varied that obviously they offer innumerable problems for study of which I have selected five that seem to me of particular interest and likely to stimulate discussion.

1. The early diagnosis of intracranial conditions.
2. Syphilis and choked disc.
3. Spinal exploration.
4. Multiple operations and control of cerebro-spinal fluid in cranial cases.
5. Treatment of compound fractures of the skull with open dura.

1. Ever since surgeons began to operate upon intracranial conditions they have been insisting that if they could get the cases earlier they would have better results. This cry has been so insistent and often repeated that the clinician may have become a bit suspicious of the surgeon. However, the need of recognizing these cases earlier than they have been in the past can not be emphasized too strongly nor too frequently. It is interesting to consider why intracranial cases come to the surgeon later than other conditions that require surgical interference. There are two reasons for this:

First, the idea is still very prevalent that cerebral syphilis, especially in the form of gummata, is a very common lesion. Whereas cerebro-spinal syphilis, a disease which affects the meninges primarily, does occur frequently, a focal lesion of the brain due to syphilis is very rare, much rarer than a new growth. This misconception has led men to institute a prolonged course of anti-syphilitic treatment and this loss of time has permitted a neoplasm to make tremendous headway. The rule laid down by Victor Horsley in the early nineties that four to six weeks of energetic anti-syphilitic treatment should be ample to determine the efficacy of this treatment holds good today, though I am inclined to shorten the period. If, after three weeks of such treatment, the patient does not show definite improvement in symptoms, the possibility of a mistaken diagnosis should be immediately considered. However, the treatment during that period must be intensive.*

The other cause for the lack of early recognition is that men still look for the triad of symptoms, headache, vomiting, and choked disc to establish the diagnosis of an intracranial lesion. I have over and over again seen cases that had an intracranial lesion which presented none of the triad just named. In children particularly, headache very commonly occurs late in the disease and often is not a striking symptom at any stage. Many intracranial new growths merely replace tissue instead of displacing it and consequently the pressure in the intracranial cavity is not in-

*Read in Section on Surgery, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

*By intensive treatment I mean that the patient must be mercurialized and receiving large doses of iodids, and if arsphenamine is used during these three weeks he ought to receive two, possibly three, doses. In those cases in which a choked disc is present, arsphenamine should not be given, as it occasionally aggravates the ocular condition.

creased and pressure symptoms do not occur. In these cases the focal symptoms of the lesion may stand out very prominently and make it very possible, if they are recognized, to make a better localizing diagnosis than where the focal symptoms are obscured by the general pressure phenomena.

Jacksonian epilepsy, which in a certain percentage of cases occurs, is also very generally misunderstood. Many men believe that the only type of convulsion which should be called a Jacksonian convulsion is one which begins with convulsive movements in the face or in one extremity and which then spreads over the entire body. This is but one manifestation of a true Jacksonian convulsion. Any epilepsy is of the focal or Jacksonian type in which the same sort of aura (premonitory sign) initiates each convulsion. These auras may differ greatly. They may be motor, as for instance the characteristic movements of the thumb, toe, or one side of the face, or sensory, characterized by a sensation of taste, smell or vision, and that very peculiar condition known as the "dreamy state." However, to get the history of such a sensory aura from a patient is very difficult and the questions to bring this out must be formulated with great care. I often tell my students of a case that I had about ten years ago where the patient had a very characteristic aura of taste. He said he tasted blood prior to his seizure and when asked whether he had ever tasted blood, he did not remember that he had, yet was certain that this was the sensation he had had. Had this point not been elicited, the interpretation of the case would have been very different, for when the man's convulsive movements started they always began on one side of his face, and from this one would have supposed the site of the lesion was in the lower motor area, whereas the aura of taste which preceded the convulsion indicated that his primary lesion was in his temporal lobe. An operation directed to this point revealed a tumor which would have been missed had the motor phenomena alone been noted.

Where, then, should the blame be placed for these errors in diagnosis? Without a question, the fault lies with our medical schools. A glance at the curriculum of even the best schools will show how little time is devoted to the study of nervous diseases, while the study of surgical diseases of the nervous system usually is not mentioned. In the past eight years I have busied myself with this problem. Every student who graduates must at least be able to make a thorough neurological physical examination. He must be acquainted with the accepted methods of treating fractures of the skull and spinal injuries, and must be able to recognize the more common evidences of increased intracranial pressure.

2. Choked disc is occasionally caused by syphilis. The usual custom has been that a patient with choked disc and a positive Wassermann or an undoubted history of syphilis has first had anti-syphilitic measures employed to try to relieve the condition. During this treatment the choked disc has made such marked progress that the patient's eye-sight was irreparably injured or even completely lost. Whenever a choked disc is discovered, whether due to syphilis or some other cause, I firmly believe that the first thing to do is to relieve the intracranial pressure by a decompression operation and then, if syphilis is the underlying cause, to institute anti-syphilitic treatment. I have had a number of cases of this sort which have responded most remarkably to this sequence of treatment and I have seen others where a reversal of the sequence, namely, anti-syphilitic treatment first and operation afterward, has had most unfortunate results. Some of these cases had gone on to complete blindness and in others the choked disc had been present so long that partial atrophy, with its inevitable partial loss of vision, was the result.

3. Another group of cases that have proven of great interest are those that present focal lesions of the spinal cord. Every such case should be considered from the surgical standpoint. It is no longer justifiable to make a diagnosis of transverse myelitis and condemn the patient to a miserable existence without any possibility of relief. Transverse myelitis is not a pathological entity. Its underlying cause must always be determined and unless a cause is found which can be relieved by some other therapeutic measure, an exploratory laminectomy should always be performed. Exploratory laminectomy is such a safe procedure when carried out with care and

precision that there should be no hesitation in urging it. The mortality from this operation is no higher than that of a simple laparotomy and internists and neurologists must get this idea firmly fixed in their minds.

Such an experience as I had recently is not excusable to my mind. A young woman in an Eastern city, at the age of sixteen, developed the symptoms of a transverse lesion of the cord. At the end of four months she was completely paralyzed and had anesthesia of her entire body below a line passing just below her breasts. The neurologist who saw her at that time made a diagnosis of transverse myelitis and told her that her condition was hopeless. A few months ago, nine years after this diagnosis had been made, she came into our hands and without difficulty we were able to remove a large spinal tumor. However, her cord had been compressed for such a long time that it is doubtful if she will have much return of function. This, I grant, is an extreme instance of what I mean, but I see over and over again cases of spinal tumor that have been permitted to progress much longer than there is any justification for. Every patient with a spastic paraplegia should have a most careful sensory examination to determine if there is any evidence of segmental localization, and if this is found and tuberculosis of the spine has been excluded, the patient ought to be turned over immediately to a surgeon.

4. Multiple operations have been a prime factor in bringing about better results in intracranial cases. Where formerly an operation was done in one stage, now two, three, or even four stages are considered advisable. It may be necessary to decompress a patient on both sides of the head before it is safe to attack the lesion itself. The most difficult problem in intracranial surgery is to cope successfully with the increased pressure conditions. Planning these various steps requires much thought and a careful weighing of the evidence to determine how much of an operation the patient can safely stand. Two patients may be in apparently identical condition with the sole difference that while one has a regular pulse, the pulse of the other is somewhat unstable; yet that may be the deciding factor. Success or failure may depend upon the choice of the side on which to do a decompression first; for if in the case of an unlocalizable tumor the preliminary operation were over the tumor, its ultimate removal might be seriously interfered with. In the cases of unlocalizable tumor, the new method of studying the deformity of the ventricles by x-raying an air-filled ventricle may be helpful, but until we know more about the normal x-ray appearance of such a ventricle this method is still in the experimental stage.

The other factor is our better understanding of the origin and absorption of cerebro-spinal fluid. Its judicious removal either before or in the course of an intracranial operation is an important factor for the success of such a surgical procedure. At no time should a dura be opened if the brain is under increased pressure without first making an attempt to remove sufficient cerebro-spinal fluid to lower the intracranial pressure. There are cases, it is true, where repeated attempts to enter the ventricle fail and the surgeon is forced to open the dura without first removing cerebro-spinal fluid. However, these cases are comparatively rare, if the surgeon is not discouraged by his first failure to get into the ventricles. Such failure is usually due to a collapse of the ventricle on the side of the tumor and for that reason it is always wiser first to aspirate the ventricle on the side opposite that on which the lesion is supposed to be present. Ventricle puncture has become such a routine procedure with us that we rarely do a craniotomy without performing it. There are those who claim that to withdraw cerebro-spinal fluid is a dangerous procedure, but I have never yet seen a case in which I felt that we had done any harm.

5. Compound fractures of the skull in which the dura has been opened are of particular interest since they have been so very common among soldiers. In civilian life we do not frequently see cases of this sort. However, it so happens that in the past year when the treatment of this question has been vividly before us, we have had a number of cases brought into the hospital of just this sort. The fracture was so extensive that the brain was exposed and oozing out of the wound. These cases in

the past have done poorly and not infrequently, even if the primary operation has turned out satisfactorily, the patient has later developed a brain abscess. It has seemed to me that these cases ought to be treated along the same lines as wounds elsewhere in the body and that a distinction should be made between a contaminated brain wound and an infected one. That is, in the first few hours after an injury occurs, a wound may be soiled, but as the organisms have not yet had an opportunity to grow, it can not be considered truly an infected wound. If at this time the brain is treated in the same way that contaminated wounds elsewhere in the body have been treated, we ought to get good results.

On the Western front surgeons had startling results in the past two years by employing this method in wounds of the soft parts or the extremities. In the few cases that we have had in the past year we employed the same method, excised the edges of the scalp wound, then the traumatized dura, and finally, with a sharp knife, the traumatized brain tissue. We have gone far enough beyond this traumatized area so that our incision was made through healthy brain tissue. After ligating any vessels that had to be cut we have immediately put in a fascial transplant taken from the thigh to close completely the defect in the dura. Then with great care we have made a plastic on the skull so that the wound could be closed completely with layer suture. In those cases that we have had, this has invariably worked successfully.

Of course, the drawback to this method of procedure is that one may have to sacrifice portions of the brain, the loss of which will partially incapacitate the patient, for instance paralyze an arm or a leg, but many patients after cortical excision regain some use of their extremities. Besides, severely traumatized brain tissue nearly always loses its function and does not regain it. My own experience with this type of case has led me to recommend a wider application of the procedure just described. However, if it is to be employed, two points are essential to my mind in its application. One that the defect in the dura must be replaced; the other that a plastic operation must be done so that the defect in the skull can be completely closed without drainage even though a large granulating area be left over the intact skull at some other point, for nothing imperils an intracranial operation more than any attempt at drainage.

In discussing the above five topics, I have not attempted to deal exhaustively with them, but have tried to emphasize those phases of the subjects which are of greatest importance to the men who first see these cases.

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## DISCUSSION

### Papers of Drs. Coleman and Sachs

*Dr. Joseph E. J. King, New York, N. Y.*—I have had the pleasure of working with Dr. Coleman, or operating on the same neuro-surgical services at the two Army hospitals mentioned by him, and I wish to agree with the general principles laid down in his paper. I shall limit my discussion to the stressing of two or three points which he brought out.

We have received cases which had remained on other services in the hospital for some time without a diagnosis of peripheral nerve lesion having been made. Especially is this likely to occur in fracture cases. In some instances, our neurological consultant, in looking over the wards, would find these cases. I venture to say that now there are a number of cases going about that have been overlooked and a diagnosis of peripheral nerve lesion has not been made.

Another point which I wish to emphasize is the method of exposure of these nerve lesions. In the majority of cases, if one were to cut down and attempt to find the nerve at the site of the lesion, it would be very difficult. The nerve, if not divided, may be densely embedded in scar tissue; or, if divided, the intervening space may be filled with scar tissue, in which the nerve ends are firmly embedded. Therefore, it is advisable to place the incision over the course of the nerve and expose the nerve above and below the site of the injury at points where it will be readily found. The nerve is lifted up, a tape wet in saline is looped about it, and dissection and freeing of the nerve is made toward the site of the lesion from above and from below. This procedure will lessen the time of an essentially long operation considerably. I have seen operators lose half an hour or more in "looking for" the nerve at the site of the lesion.

As to the indications for neurolysis, I think this is to be recommended early in cases where the trunk of the nerve is involved, but with caution at sites where the operation would be complicated by numerous nerve branches. There are certain sites where the nerve gives off many branches and neurolysis in these may result in section of nerve branches which have not been involved at all. Especially would I hesitate in doing an early neurolysis of the median and radial nerves in front of, and just below, the elbow and the ulnar nerve in the upper third of

the forearm. Neurolysis of these nerves in the arm, and of the median and ulnar in the lower forearm, does not present such difficulties.

In the case of large defects of the nerve which can not be corrected or overcome by position of the limb, or transposition of the nerve, or both, so that the nerve suture can be done, I think that it is advisable to suture the nerve ends, without resection, *a distance*, with strong silk sutures through the fibrous ends, the limb in flexion, and later perform the suture of the nerve at a secondary operation, after the limb has gradually been extended. At the time of the secondary operation it will be found in many cases that the resected ends can be readily approximated. Nerve implantation is discarded and I advise a nerve-graft only as a last resort after failure to approximate the ends at a secondary operation. Even in these few cases the defect will be much smaller. Tendon transplantation is to be recommended in many cases of lesions of the dorsal interosseous and femoral nerves. One does not see many cases of injury to the femoral, because most of these cases die early after being wounded on account of injury to the large iliac vessels. I have seen only three.

I wish vigorously to condemn any effort to correct these defects by turning nerve flaps from above or below. I think this procedure has been given up by practically all operators. I do not think that it should be done in any case.

We have found that by transposition of the nerve, in many instances, large defects can be overcome, and a nerve suture be performed, when otherwise approximation of the nerve ends would be impossible. This applies especially to lesions of the ulnar nerve from the middle of the arm to the lower third of the forearm.

The technic of nerve suture is the same as I used in 1916-17 on about twenty cases in Reserve Lazarett No. 1, Oppeln, Silesia, with the following exception, or difference: the enveloping fat-fascia transplant has been discarded by us and all operators with whom I have spoken. It was formerly used about the site of the suture, having as its object the prevention of scar tissue. We have never used gelatin tubes, calf arteries, silk trellis sutures, etc., for bridging over the defect in the nerve.

*Dr. J. Shelton Horsley, Richmond, Va.*—Dr. Sachs' plea for early operation in brain tumors should really be unnecessary, but it is not. Brain tumors are infrequent. If they were as common as breast tumors it would be obvious that they must be treated soon, and it would not be necessary to plead for early operation. Exploiting the decompression operation has also done a good deal of harm. Most surgeons think that all that can be done for these cases is a decompression. Possibly with the general surgeon a decompression operation is all that he should undertake, but the men who specialize in brain surgery can do very much more for these patients than a mere decompression if they can only get them early. It may be that a decompression is necessary as a preliminary step, just as the drainage is necessary as a preliminary in prostatectomy, but these cases should be operated upon early if any hopeful prognosis is to be held out.

Another question is about the scar tissue in the brain. Scar tissue in the brain we know injures the cells, and the slightest injury to the brain will produce a very much greater scar than a similar injury to the peritoneum. In the peritoneum you merely get an adhesion, but in the brain you get damage to the cortical cells. The smaller the scar the less the loss of function. If you can not do away entirely with the scar, then make it as little harmful as possible. If the scar contracts and binds the brain to the bone, with the pulsation of the brain there is an additional injury. This can sometimes be avoided by the use of fat and fascial transplants.

In the question of syphilis, as Dr. Sachs has pointed out, because a man is dying from too much pressure in the brain because of syphilis, is that any reason why we should not give him some help? The effects of the syphilis may wear off in time if he be given proper treatment, but the man who is drowning does not need help when he reaches shore. If the decompression operation is done to tide over the emergency, the anti-syphilitic treatment can come afterward.

*Dr. Charles E. Dowman, Atlanta, Ga.*—There was one point that suggested itself to my mind during the discussion of diagnosis of brain lesions and the localization of tumors, namely, that one doing neuro-surgery should have training in neurology. Unless a surgeon is devoting a great amount of time and study to this special field of surgery, he is not well fitted to perform, with proper judgment, even the preliminary stage operations as mentioned by Dr. Horsley. A discussion of the dural penetration and compound fracture cases is now more of historical interest than of practical value. Nevertheless, there was such wonderful progress made in the treatment of such conditions during the recent war that I would like to outline briefly the technic, as developed by Cushing, which was responsible for this progress. The work of Dr. Cushing was probably the greatest American contribution to war surgery after this country entered the conflict. The Carrel-Dakin treatment of infected wounds had been developed, as had also the technic of handling joint and chest wounds, before we entered the war. However, there was great room for improvement in the treatment of brain injuries, illustrated by the fact that in the hands of British and French surgeons the mortality of compound fractures of the skull with dural penetration was 60 to 65 per cent. In the summer of 1917, Dr. Cushing undertook this problem and by developing a special technic succeeded in reducing this mortality to about 28 per cent.

The main features of the Cushing technic were as follows:

1. The use of local anesthesia, in the form of 1 per cent. novocain-epinephrin after a preliminary injection of morphia, gr. 1/3. The routine use of local anesthesia in head cases had been advised by Colonel Gray, of the British Army, and was adopted by Dr. Cushing.

2. The thorough excision of the scalp wound with three incisions radiating from the excised area, thereby giving flaps which could eventually be approximated in effecting a closure.

3. The block removal of bone, the cranial de-

fect being in the center. In this way as the missing bone fragments are recovered the mosaic can be constructed and one can determine when all fragments have been removed.

4. The careful excision of the soiled dural edges, the removal of bone and shell fragments and the debridement of the contused brain. The latter is accomplished with a soft rubber catheter and Carrel syringe. By collapsing the bulb of the syringe a negative pressure is produced when the bulb is released, the divitalized brain being sucked out. Bone and shell fragments can also be palpated with the catheter and removed with specially devised forceps. With this method it is seldom necessary to insert the finger in the wound. I wish to take issue with Dr. Sachs in regard to his excision method of debridement. By the suction method all contused brain can be removed without injuring healthy brain tissue, which can not be said for the excision method.

5. The careful closure of the scalp wound after the completion of the debridement. One point in regard to these primary sutures. I was fortunate in being assigned by Dr. Cushing to do neurosurgical work in the forward areas in France. At first we attempted to close all scalps in dural penetration cases. However, later in our experience, we found that soldiers who had very dirty wounds which were usually more than twenty hours old, did better if we left the scalp and dural wounds open. In such cases we always got the expected brain fungus. By keeping the surrounding scalp scrupulously clean, covering the fungus with sterile rubber tissue and protecting it from all pressure by means of cotton doughnut dressings, we found that in a good percentage of cases the infection and edema would subside, the fungus would disappear, and in fifteen to twenty days the wound would granulate over.

*Dr. Roades Fayerweather, Baltimore, Md.*—Major King spoke of the fact that most surgeons operating upon peripheral nerve injuries had discarded the use of enveloping substances such as fascia and tubes made of various materials. It was my good fortune, in 1917, to be stationed for some months at Leeds in one of the largest of the British reconstruction hospitals. There they had an enormous amount of material—their legacy of three years of war. Among those cases was a very large proportion with peripheral nerve injuries. Two clever surgeons were working there, side by side. One, before burying his liberated or sutured nerves, invariably enveloped them in Cargile membrane, after first painting with sterile vaseline. The other used no covering material, merely closing the wound in the usual manner. The results were good in both groups. All nerve cases in that hospital were reviewed every thirty days by the neurologist, Captain J. Le F. Burrow (see his report in the *British Journal of Surgery*, 1918). In following these cases he could detect no difference in the progress they made. However, reports from various sources show that in some cases the enveloping of the nerve has proved absolutely harmful. In some cases that have later been reopened these substances appeared accountable for a large amount of new scar tissue that had damaged the result of the operation. Thus, whereas in the hands of clever, careful surgeons the enveloping procedure may not be harmful, nevertheless it evidently does no good. It was interesting to see the two methods employed under the same conditions and in the same place.

One point that Dr. Coleman did not emphasize, and yet I know that he, no less than other neuro-surgeons, lays stress upon it, for I was stationed for some time at the same place with him and Major King—is the maintaining of a dry field during the operation and the insuring of a dry closure. This is very important. As a rule, it is difficult to keep the field dry. Scar tissue in the deeper layers is much more extensive than indicated by the surface scar and cutting into this tissue causes a great deal of oozing. The use of a tourniquet is to be studiously avoided in these operations. Personally, I have seen two cases in which, after closure, the whole field had to be immediately reopened because of bleeding. In both cases the nerve dissection and the suture had been done with excellent technic under a tourniquet. One can feel sure that even had the bleeding in these cases been insufficient to require reopening of the wounds, and further hemostasis, it still would have provoked the formation of a needless amount of internal scar tissue.

*Dr. J. S. Rodman, Philadelphia, Pa.*—This is a field of surgery which is so highly technical and the general surgeon as a rule has had very little experience in it, that I have some hesitancy in getting on my feet to discuss the paper.

I think there are two ways of taking care of surgical conditions of the central nervous system. The best way is by the trained surgeon-neurologist, one of our best examples, of course, being Dr. Sachs. The other way is to have the general surgeon operate with the trained neurologist at his elbow. I think good work can also be done this way.

I agree with Dr. Sachs that we have been waiting too long in our cases of brain tumor, and often in spinal cord tumor. I see no reason why we should not do craniotomies and laminectomies more frequently, especially laminectomies. The mortality is not high in these cases, 10 per cent or even less, and I think these exploratory operations should be done more frequently.

I wish to take issue a little with Dr. Sachs in regard to multiple operations. Sometimes it is necessary, but recently I have tried wherever possible to finish the operation in one stage. I think it advisable to do this wherever we can. It is not always possible, but I believe we usually can do it.

I also wish to testify to the work done on the other side, particularly by Dr. Cushing, in the excision of wound tracts. I have tried a few of those operations in civil practice, and it has worked out very well.

I think one of the best things that Dr. Sachs brought out is not to drain in these cases. It is difficult to close these cases dry, and in order to have drainage we must have them absolutely dry. I should be glad to have Dr. Sachs tell us whether he uses the tourniquet now, and just what methods he uses in checking the hemorrhage in these cases.

*Dr. Coleman (closing).*—I could not cover all the features of peripheral nerve surgery in a

short paper and some of these had to be omitted because of lack of time. Naturally if any kind of protective material is used to encapsulate the nerve at the suture line it should be done with a full understanding of the tissue response to a foreign body. When we introduce a foreign body into the tissues, hyperemia results. This hyperemia may increase the amount of scar formation, the very thing we are anxious to avoid.

I would like to discuss Dr. Sachs' paper for a minute along a similar line. I believe there is a disadvantage in transplanting fascia in some of these head wounds. The scars on the cortex of the brain have a very different significance from those on other portions of the body. When we transplant connective tissue to the brain we do a thing which encourages fibrous tissue formation and this is very undesirable. We introduce a piece of tissue which must derive its blood supply from the surrounding tissues and there is consequently an excess of hyperemia.

The whole question, as Dr. Sachs has presented it, is one of intracranial tension, and it is very unfortunate that we often see a diagnosis of intracranial tension deferred until the patient is in the terminal stages of this intracranial tension. The rise of blood pressure should be considered one of the later stages of intracranial tension. There are other methods of determining intracranial tension which can be used earlier. I believe the time is coming when decompression will not be used in tumor except in certain well-selected cases—those cases where the patient's condition will not admit of any other form of operation. If the patient has a supratentorial tumor, it seems to me an osteoplastic flap should be turned down and the hemisphere explored, even though the tumor has not been definitely localized. If the tumor is subtentorial it seems to me that puncture of the corpus callosum often gives good temporary results preparatory to a radical operation.

*Dr. Sachs (closing).*—About the question of decompression which Dr. Horsley brought up, I quite agree with him that we have passed the stage where decompression is all that we can do with brain tumors. I absolutely disagree with Dr. Coleman that an osteoplastic flap should be the first procedure. Even if you know just where the tumor is, it often, I think, is not advisable. I have had some bad results by doing too much at the first operation. The first thing is to save the eyes and prevent these patients from going blind. When the general pressure symptoms are reduced, then you can go after the tumor.

In regard to the use of fat and fascia, I have had occasion to open several cases where fat had been used and I do not use it any more, because I have found in these cases that the fat seems to stimulate the production of connective tissue. However, I have found that the use of fascia does not stimulate scar tissue because, especially where you have removed a brain tumor, a certain amount of cerebrospinal fluid collects between the brain and the fascia and prevents the formation of a scar on the brain.

As to the point Dr. Dowman brought up regarding the use of a catheter which Dr. Cushing recommended instead of the knife, we must remember that the wounds in civil life are different from war wounds. In the cases in civil life, the wound of the brain is always very superficial, and so I use the knife in these in preference to the catheter. In the deep, penetrating wounds I agree with Dr. Dowman about the use of the tube.

In regard to the tourniquet, I have found it very unsatisfactory.

One of my students has shown that you never get a fungus of the brain unless you have an injury of the arachnoid, but that is too big a question to go into at this time.

One question Dr. Rodman brought up about closing the cranial wounds without drainage, and and what to do to be sure that the wound is dry. No one way, I should say, covers it. You must keep on until the oozing has stopped. The little thing Sir Victor Horsley recommended, the use of hot saline solution, is very effective, but even that does not stop it in all cases. In some cases I have made a very minute stab wound incision about an inch or two from the incision and put in a little rubber tissue drain, which is removed in twenty-four hours and must never be replaced. That has been very helpful and was recommended by Dr. Cushing, as so many of these things have been.

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## CHOICE OF OPERATIVE METHOD IN SENILE PROSTATIC HYPERTROPHY*

By O. LeGrand Suggett, M.D.,
St. Louis, Mo.

The vast accumulated experience should have determined definitely this much discussed subject, but it has not for the reason that it is not susceptible of a definite settlement, because, like many other conditions, each case must be handled in accordance with its individual requirements. For instance, if a cystoscopic examination shows by far the major portion of the tumor to be intravesical, the suprapubic is the route of choice. If, on the other hand, a rectal examination shows the adenomatous mass to have grown laterally, posteriorly and downward and to be of moderate size, the perineal route may prove the more accessible. This is the better route for the removal of those small fibrous prostates, which are the result of earlier inflammatory conditions and not to be classed with true senile hypertrophy. The varying depth of the perineum in

*Read in Section on Urology, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

these patients, also the varying thickness of the abdominal wall, are determining factors in the choice of routes.

Vesicle calculi so often found in prostatics are more easily removed from above, and are often overlooked in the low operation, necessitating a second operation for their removal. I have known this to

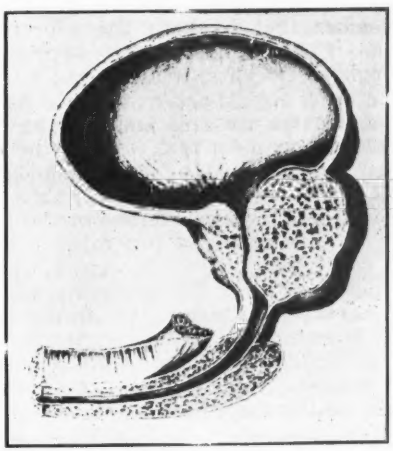
(Illustration from Deaver.)
This case is adapted to the high operation.

occur. However, all things being equal, the suprapubic is perhaps preferable despite its longer convalescence and greater mortality, which is 4 to 6 % as against 3.7 to 5.8 % by the perineal route.

In explanation of your natural query why one should adopt the graver operation, consider the reasons for operating upon these patients at all. It is for the relief of distressing symptoms and the possibility of serious complications and to restore them as nearly as possible to their ability to urinate normally. The suprapubic route subserves best this purpose for the reasons, first, that prostatic growths have been known to recur following their perineal removal; epididymitis and stricture never occur; the sexual function, if active, is not interfered with. Greater than these are the incontinence of urine and damage to the rectum resulting in a distressing and almost irreparable fistula which frequently follows the low operation. I have not forgotten Dr. Young's illustrated operation before our St. Louis Medical Society for its repair. To my mind the accessibility and the adaptability of the two routes may well be compared with vaginal and abdominal hysterectomy,—the latter being the better surgical procedure, being entirely under the eye at all times and hemorrhage being almost nil up to the moment of enucleation and of no consequence then, if we find and adhere to the proper line of cleavage.

To facilitate and insure this latter I conceived and adopted an idea that I would like to call your attention to, based upon my experience in the intra-urethral removal of the gland. It is most surprising what enormous growths may be removed through the urethra by the method of Cunningham. This stone that I want to present, not on account of its rarity, because it is of the ordinary mulberry variety, but because of its striking resemblance to a child's jackstone, I found back of a prostate the size of a large lemon which I removed by this method from a patient of Dr. Samuel Peden.

The plan just referred to in finding the line of cleavage and avoiding hemorrhage is this: we know that the venus plexus lies between the sheath and the true cap-



(Illustration from Deaver.)
The perineal route might be the one of choice here.

sule of the prostate and principally anteriorly. By a series of dissections I endeavored to ascertain whether or not the capsule surrounded each lobe independently or, in other words, if it dipped down and covered the portion of the gland which surrounds the prostatic urethra. Of

course I found that it did not. Compare the prostate with an orange through the center of which a tunnel has been made and into which a pliable soft rubber tube is inserted, representing the urethra, and assume that the rind of the orange may be compared with the capsule of the gland.

(Illustration from Deaver.)
The high operation is the one of choice here.

Remember that by both the suprapubic route, if the gland were approached through a crescentic incision just outside the internal vesical orifice, and also by the perineal extra-urethral method, the enucleating finger must pass through the zone of danger in attacking the adenomatous mass. I believed that the friable and easily-torn mucous membrane of the prostatic urethra could be penerated readily, and in working from the center toward the periphery I could determine when I had reached the capsule. Its fibrous character is accentuated through the pressure exerted upon it by the numerous adenomatous masses. Hence the entire operation would be intracapsular.

Many surgeons have adopted various means of incising the envelopment of the gland, such as nail files and mandolin picks, knives and scissors. The incisions into the lateral lobes in the Young operation are quite familiar to you all, as well as the semi-lunar incision just external to the intravesical orifice of the urethra in the high operation. I adopted the plan of attacking the mass through the urethra in the high as well as in the low operation, and have never found it necessary to use any specially devised instrument in doing so. In a majority of hypertrophied prostates there is a sclerosis of the vesicle neck which is rather firm and unyielding, and if you force your conical forefinger through the vesical opening into the prostatic urethra, almost invariably a rent will occur at the point of least resistance, generally in the longitudinal direction of the canal. This is less likely to bleed than an incised opening. It readily admits your finger, and the enucleation may be conducted with comparative ease.

As to the further technic of the high operation, I learned from Dr. Judd, at the Mayo Clinic, that it was unnecessary to fill the bladder with fluid. This is done almost solely for the purpose of identifying the position of the bladder and to get the peritoneum out of danger of injury, and would, upon incision into the bladder after your guy sutures have been placed, flood the space around the bladder with water which can not possibly be sterile. Air distention may also be used.

I was in hopes that I would be able to present to you the special bladder retractor used by Dr. Judd, who does the

(Illustration from Deaver.)
Clearly this is a case for supra pubic removal.

major portion of the genito-urinary work at the Clinic, but I have been unable to secure one. It is a splendid retractor with two blades, and it may be readily introduced into the bladder, closed, and expanded after introduction, giving one a full view of the interior as well as the

operative field and dispensing with assistants. Undoubtedly preliminary drainage affords relief to the kidneys and lessens the operative mortality very materially. A point I wish to emphasize is my belief that an inlying catheter subserves this purpose quite as well as a preliminary cystotomy of the two-stage operation, which I find so many urologists religiously following. The worst you may expect is a urethritis, which is certainly not to be compared with a cystotomy wound, which invariably becomes infected, and is in itself by no means a minor operation, despite the ease with which it may be done under local anesthesia. Furthermore, I see no means of preventing the bladder wall from becoming adherent to the abdominal wall, which would permanently fix an otherwise distensible and freely-movable viscus, besides giving the patient the constant annoyance and discomfort of urine-soaked dressings. The only advantage I can see in a preliminary cystotomy is that during the drainage period the patient acquires a tolerance which lessens his shock and reaction to the second operation.

Another objection to the high operation as a whole is the more tedious convalescence and prolonged healing of the suprapubic wound, or possibly its failure to heal at all, leaving a fistula, necessitating still another operation for its repair.

I maintain that the choice of the one method or the other should not rest with the particular adroitness of the operator in that chosen procedure, but upon its adaptability to the case in hand. The four slides I shall present presently, sufficiently illustrate, I think, my meaning.

As to whether the renal complications following immediate prostatectomy are due to the presence of the residual urine *per se* is a question in my mind when I recall a number of physicians who have suffered from prostate hypertrophy and who were thoroughly cognizant of the necessity of keeping the bladder clean. They emptied and catheterized themselves with great regularity prior to coming to operation and still suffered from post-operative uremia and suppression. It would, therefore, seem that other factors were present. This, however, is a mooted question and in an article by Judd in the *Interstate Medical Journal*, early in 1917, he fails to account adequately for these renal complications.

Before leaving the subject I would like to dwell for a moment upon the etiology of senile hypertrophy, which is the most unsettled question in connection with its pathology. Gonorrhea in early life does not seem to be a predisposing factor. The majority of my patients have been from the country, farmers and others, where it is the custom to marry earlier than we do in town and they do not acquire gonorrhea. Judd in an examination of 100 prostatics found a history of gonorrhea in but nineteen. And while I was strongly inclined to believe that the oft-repeated and long-continued congestion of the prostate incident to inordinate venery was contributory, I have seen but three cases in negroes, whose propensities in that direction are well known. It would be instructive were one afforded an opportunity of examining a large number in some of the institutions for the colored aged.

## DISCUSSION

*Dr. E. G. Ballenger, Atlanta, Ga.*—I agree with Dr. Suggett in two of his main points: first, that the suprapubic route is preferable to the perineal, and second, his method of operating. I feel quite sure that the hemorrhage will be much less when the enucleation is started in the way he does it. As to his objections to the two-stage operation I am inclined to disagree. There is a great advantage in having the two-stage operation, and I believe the greatest advantage is the lessened shock at the second stage. As to the management of the first stage, for two years we have been using a sharpened obturator which fits into a half-inch rubber tube. We go down to the bladder under local anesthesia as in the usual operation, and when the peritoneum is pushed back, by a slight boring motion the obturator is pushed through the bladder wall, no incision being necessary. It can be done very quickly and saves a great deal of time by not having to put in the purse-string suture. It keeps the patient perfectly dry until the second stage of the operation.

We think the suprapubic method has many advantages over the perineal, but are willing to admit that Young and many others can get good results in that way; but I think in the hands of the average man the suprapubic route is preferable. Nothing has surprised us more in recent years than to see how slight the shock is in the second operation when it is done in two stages.

In the first stage by clamping the tube when drawing the obturator out the connection may be made and the water fluid drawn off. I think it is not a bad plan to have a little fluid escape into the incision so that he will be infected with

the organisms present as in the usual operation, to allow immunity to develop before the second stage, when there will be more extensive infection in the prostatic cavity. While we could prevent this infection we think it an advantage to have it. The wounds seem to heal more promptly after the second operation where such infection takes place. There are so many phases to this subject that further discussion would lead too far afield.

*Dr. J. H. Smith, Memphis, Tenn.*—I think one of the largest steps we have made in surgery is the abandonment of the perineal route in prostatectomy. In the two-step operation upon the bladder, removing any stones that may be there and getting the bladder sterile, with no risk to the patient at the first operation, and at the second operation having the shock greatly reduced by manipulation of the prostate and bladder, using the proper technic, we should not have any great mortality from this operation.

In our prostatectomies the great mortality is due to the fact that we get the patient late. He has put off one doctor and another and finally comes to the specialist. His kidneys are shot all to pieces, he has bacteremia, and the general infection is very severe.

I think the intraurethral prostatectomy is a very unfavorable thing to advocate at the present time. For myself, I have had no experience, but there is no doubt that the two-step operation (suprapubic) today is comparatively safe when the patient comes early enough to assure you of any results. The great trouble is that they come so late that enucleation of the prostate becomes a very hard problem. The drainage of the bladder means a great deal in the results, and I find a mild solution of boric acid very efficient in sterilizing it.

As to the etiology, I never have been able to see that gonorrhea had any effect upon the later prostatic trouble. In answer to Dr. Suggett as to whether the negro was more or less subject to prostatic trouble than the white, I think I can answer that. At the clinic in Memphis we see a great many negroes and we see more gonorrhea in the negro than in the white: so if gonorrhea had anything to do with trouble with the prostate, when they grow older they would all have prostatic trouble. Ninety per cent of the negroes when young have gonorrhea or syphilis. Recently we have been doing a routine Wassermann test on every patient in our clinic and we find that practically every one comes back positive.

*Dr. J. Hugh Carter, Memphis, Tenn.*—I think the first thing to be considered in a prostatectomy is the patient, and the doctor did not take sufficient thought of the patient. Dr. Suggett has brought out the fact that these people are sick aside from the prostate. My personal opinion is that the perineal route is indicated in only two conditions, the small fibrinous and possibly the carcinomatous. On the other hand, I believe all the other conditions should be treated by the suprapubic route. We all know that most prostatectomies are done in older people. Almost always there is the history of an enlarged prostate for years. The general condition of the patients is bad and for that reason we have to prepare our patient so that he can withstand the operation, and we can perform it and do whatever may be necessary with safety.

As to the mortality, my experience is that the suprapubic route has a much smaller mortality than the infrapubic or perineal route. Most of my friends lose their cases from uremia following the operation. If you put in a tube just like you do in a closed cholecystotomy and put on a clamp you can let just so much urine out when you wish. You need not let it all out at once, but take off the pressure gradually. I do not believe that if a patient comes in very sick and with a distended bladder we should go in and do a suprapubic cystotomy and let it all out, for if we do that patient will very likely have a uremia, but if you go in and let it out by degrees you will have the patient comfortable, and you can build him up and send him back home, if you wish, and at the same time get him ready for the second operation and remove the gland at that time. The suprapubic route is really a two-step operation and the infrapubic a one-step. We all know that sight and touch is better than touch alone, and in the suprapubic route you have both sight and touch.

It has always been my practice to wash the bladder out first with sterile water and then make my incision and then empty the bladder before going into the bladder proper. Therefore, you do not have an infected field. Of course we sometimes get cases in which we can not do anything. The patients have been catheterizing themselves and you can not get anything into the bladder under anesthesia. In those cases you have to do an aspiration right away, but in those cases where you can go in and then empty your bladder you get good results. By the siphon method you can not get it quite clean, but by the catheter you can. In the siphon method I have never been able to get in a tube that would not leak, but you can get a dry field by putting a clamp on the tube.

*Dr. Bransford Lewis, St. Louis, Mo.*—I do not believe there is much difference in opinion as to the advisability of doing a suprapubic operation in prostatectomies. In doing a suprapubic prostatectomy we should give continuous urethral drainage first. The exceptions are so few that I think they should be ignored. I may at times fail to get a catheter through a strictured urethra, but not in twenty years have I failed to get a catheter through a prostatic urethra. By using the proper catheter you can get in, and I think it is far preferable to drain with a urethral catheter for a week or ten days before going in suprapubically. Now, having done this drainage by the interrupted method, maintaining five to eight ounces of fluid in the bladder during this week, gradually draining it down and avoiding the uremia, which we all recognize as being very dangerous, we can then put in a suprapubic tube. In a man who is in very good condition it is not necessary to do the operation in the two steps, but in these advanced cases in which it is advisable to do the two stages I believe this is the proper procedure. I have a little different idea from that suggested by Dr. Suggett. In my estimation one of the points of danger in connection with the suprapubic operation is that infection sometimes occurs in the

loose tissues between the bladder wall and the abdominal wall, and it is very difficult to control. I am fearful of that complication. In order to avoid that I premeditatedly attach the bladder wall to the abdominal wall with three sutures, which I term "fixation sutures." I want to make assurance doubly sure, so before I make the suprapubic incision, I put in these sutures. This method insures against a spreading infection if you get an infected wound. In many cases the urine is badly infected and the resistance of the patient is at the lowest point.

With regard to this fixation suture I was interested in learning whether it would retard the ultimate union and healing, but my observation is that it does not retard it at all.

Another point about a suprapubic tube: I like to put in a large Marion tube at the first step, and then we have a big well and large avenue for subsequent work, requiring no further enlarging.

*Dr. A. J. Crowell, Charlotte, N. C.*—I feel that I must defend the perineal route. As many of you know, I am a great advocate of it. According to the author's concessions, the perineal operation is preferable: first, in the malignant prostate, which means about 20 % of all the cases, and in the fibrous prostate, which will add 10 to 20 % more. According to your own argument, you think the perineal route is best in these two conditions, 30 to 40 %, a big concession in our favor. The next thing in our favor is the fact that we do not have to worry about what kind of tubes we must use for drainage—all of which act as a foreign body in the bladder and a source of irritation. You also admit that the time of recovery in the suprapubic operation is longer than in the perineal.

We who believe in the perineal route believe that in some cases it is necessary to do the suprapubic operation. Our permanent results in the perineal operation, I am sure, are quite as good as those following the suprapubic operation. You speak of incontinence and stricture. If you ever run across a case of mine that has stricture or incontinence, please write me. I may have some, but if I do I don't know about them. Likely you will occasionally have one following the suprapubic operation.

Another thing regarding the preparation of the patient for operation. I believe, like Dr. Lewis, that the retention catheter is the best way to secure bladder drainage. I do not think we have had to do a half dozen suprapubic punctures to get into the bladder in all of our work. With the different kinds of catheters we have, Dr. Thompson, who has charge of the preparation of our patients for operation, seldom has any trouble in getting into the bladder and certainly if trauma has not been produced before coming into our hands. For me to say that you can not get good results following the suprapubic operation would be foolish. You can, but I am sure better results can be obtained by the perineal route.

I think we should have a lower mortality following prostatectomy than that following almost any other operation, regardless of the fact that they are practically all done on old men whose resisting power is very much lowered. One of the cases of our last series of 125 died. In another we refused to operate because we were unable to get his phthalein above a mere trace in two hours. He was ninety-two years old.

In the perineal operation the drainage is at the most dependent point, which is another point in our favor. We are always ready to compare results with the suprapubic advocates.

*Dr. Marion H. Wyman, Columbia, S. C.*—It certainly is confusing to the younger members of the profession to sit by and hear the men of large experience discuss this question in this way. The result, it seems to me, from either operation is not dependent at all upon the operation, but upon the condition of the patient before the operation. Whether the gland is removed by the perineal or suprapubic route makes no difference. With the phthalein test I have a limited experience. In twenty-one cases, not operating upon any of the cases myself, we have done a one-stage operation and five were done by the perineal route and the others suprapubically. One man refused operation and died in the hospital.

It was interesting while at the Mayo Clinic in 1916 to study the method of determining the function by the phthalein. They were not carrying out the test by the usual method and Dr. Kendall said we fellows were all wrong; that it is not a kidney function test at all, but a metabolism functional test because the phthalein comes out of the kidney and the individual cells take up the blood and send it back.

I think both methods are good and if the patient is properly prepared the mortality will be practically negative in either case.

*Dr. Suggett (closing).*—Several references have been made to tumors, carcinoma or malignancy of the prostate, whereas my remarks were limited entirely to senile hypertrophy. Dr. Ballenger seems to think that the reabsorption by the patient from the inevitably infected suprapubic wound might be beneficial in protecting him from further infection. An autogenous vaccine would be preferable, but it is highly probable that a patient with a bacteria-laden residual urine of long standing is sufficiently immunized.

I was pleased to see that Dr. Lewis coincided with my views concerning preliminary drainage per catheter. As to his method of limiting infection of the surrounding tissues through leakage, I did not know that he was the originator, for I noticed that Keyes in his last work recommends the method of suturing the bladder incision to the recti muscles in just the way Dr. Lewis illustrated.

As to Dr. Crowell's remarks, I wish to emphasize that I am not an advocate of either route to the complete exclusion of the other.

The choice must depend upon the patient, as pointed out, rather than upon the adroitness of the operator in his chosen method.

As to being unable to catheterize some cases, I have been able to do so with a soft rubber catheter stabilized by the insertion of a mandarin or stylet with the proper prostatic curve, after futile attempts with everything else.

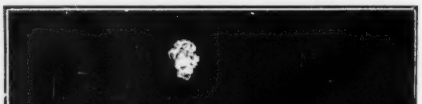
# FURTHER OBSERVATION ON THE TECHNIC OF REMOVING URETERAL CALCULI WITHOUT OPERATION*

By A. J. Crowell, M.D.,
*and*
Raymond Thompson, M.D.,
Crowell Urological Clinic,
Charlotte, N. C.

In August, 1918, we reported the removal of 29 out of 31 cases of ureteral stone without operation by a method we have been following since February, 1915. Since that time twenty-five other cases have been under our care and the stones successfully removed by this plan. It so happened that all these cases were in adults and the method could be carried out without difficulty. It is impracticable in children.

The method is as follows: A bismuth catheter is inserted into the ureter until it meets with obstruction. An x-ray picture is taken to demonstrate definitely that the obstruction is stone, as well as to ascertain its size and location. (No obstruction should be diagnosed as stone unless it is shown in the picture or the stone is recovered later. Ureteritis, ureteral stricture, kink or pressure on the ureter may cause pain, simulating ureteral stone.) Two c. c. of a 2% solution of cocain or procain is slowly injected into the ureter at the site of impaction. The ureteral spasm is so relaxed in a few moments that the catheter will usually pass beyond the stone where another c. c. or two of the anesthetic is injected to further deaden the sensation. At this point it is a good idea to distend the kidney pelvis with a physiological salt solution and inject sterile olive oil as the catheter is being removed. In this way the pressure above the stone is increased and assists in expelling it, while the muscular fibers of the ureter are relaxed and the sensation is deadened. If we fail to get the eye of the catheter above the stone, sterile oil is injected against it with considerable force in an endeavor to dislodge it as well as to lubricate the parts and dilate the ureter below the obstruction. The patient is given morphia and instructed to drink water freely. This technic is repeated every second or third day, increasing the size of the ureteral catheter each treatment. Quite frequently a No. 11 stoppered catheter is inserted and left *in situ* for hours. This is especially beneficial where it is impossible to get by the stone and the obstruction to the secretion is incomplete.

Case 1.—Mrs. S. had suffered three attacks of renal colic during the past five years, but no stone was recovered following either of these. The last attack came on six weeks previous to the time she consulted us. Present condition: She had pain in the right side radiating into the bladder, with frequency of urination. X-ray: a shadow at the crest of the ileum is shown on the right side. The stone shown in the picture was obtained after three treatments.



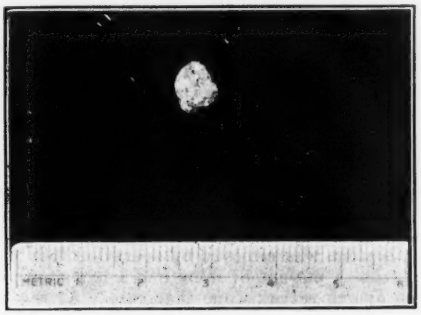

Case 1.

Case 2.—Mrs. N. complained of pain radiating into the right inguinal region with marked frequency of urination. These symptoms had persisted for three weeks. The ureteral catheter met with obstruction about three inches above the uretero-vesical opening, at which point the x-ray picture showed a shadow. No urine was obtained until the ureteral spasm was relaxed by procain and the eye of the ureteral catheter passed beyond obstruction. Six treatments were given before the stone was recovered.

Case 3.—Mr. B. had suffered occasional attacks of renal colic during the past twelve months, usually severe. Last attack came on ten days ago and since then he suffered with frequent paroxysms of colic, requiring morphia and during one attack chloroform for relief. The ureteral catheter met with obstruction (left ureter), and the x-ray

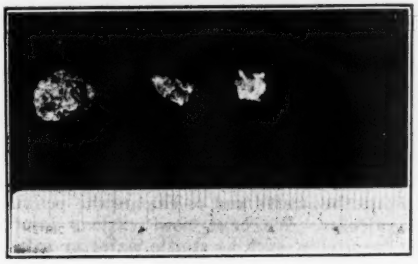
*Read in Section on Urology, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

picture showed three distinct shadows. Eleven treatments were given before the three stones were recovered.



Case 2.

Case 4.—Miss B. began having attacks of colic eight months ago, which were at times very severe, requiring morphia for relief. She noticed blood in her urine following a number of attacks. Cystoscopy showed the right ureteral opening normal; left ureteral opening edematous. Obstruction was met with about two inches from ureterovesical opening. The x-ray showed a shadow at the point of obstruction. A calculus was recovered after eight treatments.



Case 3.

Case 5.—Mrs. H. complained of pain in her left side, intermittent in character and extending over a period of ten years, during menstrual period more severe. She had great frequency of urination both day and night. Cystoscopy showed a large stone in the left ureteral opening and urine was readily seen passing around the stone. The calculus was grasped with forceps through an operating cystoscope and removed with some difficulty. The stone was so large that it would not pass through the evacuator, but was caught in its eye and removed from the bladder.

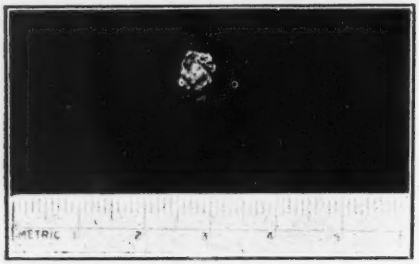
Case 6.—Mrs. W. had had attacks of colic twelve years before. Since that time she was not well; she suffered with indigestion, headache and discomfort in the back, the pain radiating into the left side and over the bladder. The ureteral catheter met with an obstruction about one inch below the umbilicus. The x-ray showed a small shadow at the point of obstruction. After several attempts we succeeded in passing the stone with a catheter only once. The thorium x-ray picture showed a very small contracted pelvis. No urine was ever secured from left kidney. Two years later a nephrectomy was done. Pathologic report was a small non-functioning fibrous kidney. This case is reported to illustrate a class of cases in which this method would not be successful because the kidney functional activity had been completely inhibited for at least two years.

Case 4.

Case 5.

Case 7.—Mr. M. had been suffering with frequent attacks of colic for two weeks, with all the cardinal symptoms of impacted ureteral calculus. Cystoscopy showed two small fragments of stone in the bladder. The right ureteral catheter met with an obstruction about six inches from uretero-vesical opening. Radiography showed a shadow in the ureter at the point of obstruction and one in the kidney pelvis. The calculus in the ureter passed after one treatment. Two days later a cystoscopy showed no stone in the bladder.

There was no obstruction to the ureteral catheter. Radiography showed a small calculus in the pelvis of the left kidney. Treatment: the right ureter and kidney pelvis were anesthetized by injecting 10 c. c. of a 2% solution of procain, followed by distending the pelvis with physiological salt solution. The patient was turned on her right side and the foot of the table greatly elevated,



Case 7.

and after deep percussion over kidney, the calculus became impacted and was recovered after seven treatments. X-ray picture show the calculus at different locations in the ureter following treatments.

## DISCUSSION

*Dr. John T. Geraghty, Baltimore, Md.*—I was very much interested in the last case. I did not know it was possible to shake a stone out of the kidney. I have tried it, but was not successful. It has always been a question in my mind whether the different substances we use are responsible for the passage of the stone, or whether it is the manipulation of the catheter. Some years ago I got up a method of dislodging the stone and used it a number of times, apparently without benefit. It is impossible to dislodge a stone from the mucous membrane and pull it down any distance, as most of the stones are rough and rugged. The use of heat, I think, has been neglected. I had a most interesting example of this. The stone could be heated up by an electric catheter to about 118°, the stone being about 5 cm. I passed the catheter up by the stone and turned on the heat. The patient had previously been given a large quantity of water, and as I slowly withdrew the catheter the stone followed down to the meatus and I was able to dislodge it. I tried the method several times afterward, but was never so successful.

Papaverin is the method we have used somewhat in these cases. It has all the qualities that you could desire in the ureter. It causes almost complete paralysis of the muscle and always complete relaxation. The great disadvantage of using a drug at all is that you can not confine the action of the drug to the region below the stone, but affect the ureter above the stone also because some of the drug will naturally pass up. Then you have not the peristaltic action to force the stone off. If we could devise a method whereby we could confine the relaxation to the ureter just below the stone, we could dislodge many more of these stones. For that reason, I think that heat, which confines itself to the region below the stone, should have as good an action as anything that we can employ at present.

*Dr. Marion H. Wyman, Columbia, S. C.*—I should like to ask Dr. Crowell if he followed up these cases and how the kidneys picked up and functioned afterward, if he followed them for any length of time. Just briefly I wish to state that a stone was removed by operation four years ago from a patient of mine and I had occasion a week ago to recystoscope that case. At the time of the operation the test showed 45 per cent for the well kidney and nothing at all for the diseased kidney. Four years afterward the diseased kidney had gone up to 18 per cent and the well kidney had dropped to 25 per cent. It was interesting to see how the well kidney had compensated for the diseased, and when it picked up again this compensation was readjusted.

*Dr. H. A. Fowler, Washington, D. C.*—In any given case of stone in the ureter the method of treatment will necessarily depend upon a complete diagnosis. And this involves not only the location and size of the stone, but also the probable length of time the calculus has been present in the ureter. If the stone has been present for a long time, it is probable that the renal function has been interfered with, possibly infection has occurred, or there may or may not be associated ureteritis.

In recently impacted stones, which, I presume, is the class of cases to which Dr. Crowell refers, it has been our custom to use the ureter catheter to dilate the ureter and to change the position of the calculus. We have used various injections into the ureter, such as sterile water or salt solution, sterile oil and glycerine, and we have used papaverin. We seem to have obtained about the same good results with the one as with the other. So I feel with some others that after all the results depend not so much upon the solution injected as the manipulation with the catheter.

In cases of recently impacted stone where the x-ray examination shows the stone not too large to pass we instruct our patients to go home, drink plenty of water and pray as they never prayed before for a stiff attack of renal colic in the hope that the stone will pass into the bladder. In several instances we have watched the descent of the stone from the pelvis to the bladder by means of interval x-ray plates. In a very recent case I do not know how effective the prayer was, but an unusually large stone was followed in its travel from kidney pelvis to bladder. We helped

a little, perhaps, in its passage through the lower segment of ureter by the passage of a ureter catheter and injection of oil.

The chief thing in these cases is a complete diagnosis. It is generally useless to attempt the removal of a stone from the ureter by such means if the kidney function has been markedly reduced, etc., or if there be a stricture present. In cases of recently impacted stone, ninety-nine out of a hundred—an obvious exaggeration for purposes of emphasis—will pass if left alone and not subjected to an open operation.

*Dr. Courtney W. Shropshire, Birmingham, Ala.*—For several years I have been using an injection and later passing a catheter up as far as possible, but in some cases I can not get the catheter by the stone. In these cases I use about a No. 6 catheter, with a No. 7 or No. 8 bulb, thereby engaging the ureter. I inject my solution under slight pressure, hoping to dilate below the stone and this obstruction, keep my catheter in for a few minutes to get the action of the drug, and I have had fairly good results. Like Dr. Fowler says, it may have been the prayers of the patient that helped pass the stone. In the stones that are impacted low down, I have found that the metal-tipped bougie of graduated size can be forced up and in some cases, following Dr. Young's suggestion of several years ago, I have found that catheterization will separate the stone somewhat and bring it into the os.

*Dr. Crowell (closing).*—In reply to the question of Dr. Wyman, I did not follow these cases up to see if the kidney function improved after the removal of the stones. Where there has been no infection the function certainly will be restored.

Dr. Fowler asked how long the impaction had persisted. Of course we do not know in all or absolutely in any of our cases, but we have some on record in which the symptoms had persisted at intervals for years. Dr. Fowler thinks 90 % of these stones will pass out if left alone. If this be true it will be a good idea to impress this fact upon the surgeon and persuade him not to operate upon them.

In one of our cases, the stone was located at the uretero-pelvic junction and had produced intermittent attacks of colic for a number of years. Ureteral catheterization showed not only pelvic infection but parenchyma degeneration as well. Repeated tests showed its functional activity practically *nil*, but the opposite kidney was quite active. The kidney appeared so normal at operation that, but for the knowledge of the diseased condition obtained by repeated phthalein tests, the stone would have been removed by pyelotomy and the kidney left. Pathological examination showed a thin atrophic cortex with unusually prominent medullary rays. The parenchyma appeared much lighter in color than normal. Microscopicaly, the renal epithelium showed definite cloudy swelling and simple necrosis with fragmentation of nuclei and considerable desquamation of renal epithelium. This case is reported to emphasize the importance of knowing the kidney's functional activity in every case where any kidney operation is considered.

# EYE, EAR, NOSE AND THROAT

## A BEGINNER'S EXPERIENCE IN BRONCHOSCOPY*

By T. W. Moore, M.D.,
Huntington, W. Va.

### CASE REPORTS

Case 1.—The day after my return from postgraduate study, including a course in bronchoscopy, a twelve-year-old girl was brought to me with the history of having inspired a piece of cornbread crust the evening before. She had had several attacks of dyspnea, in two of which she had developed cyanosis and at one time lost consciousness for a few minutes.

The patient was a very large, well-developed girl for her age. Aside from a slight hoarseness she seemed to be suffering no discomfort.

After wrapping the girl papoose fashion and sterilizing the tube, my assistant and I attempted to introduce it into the trachea, but were unable in three successive efforts to keep the child from loosening herself and getting the tube out of the larynx, either with her hands or by movements of her body. We asked the little girl to lie on a couch, whilst we prepared for a general anesthetic. When almost ready, the family physician exclaimed, "The child is dead!" Examination showed that she was very cyanotic and that respiration had ceased entirely. I immediately did a tracheotomy and removed the bread crust, which was just below the cords. After artificial respiration a few minutes, the patient's breathing became regular and in a week she left the hospital in excellent condition.

A very interesting factor is that the family physician, who sat beside the patient's couch all the time, insists that after the patient lay down, which she did voluntarily, she did not struggle or make any movements, and he only discovered her condition when we requested him to bring her to the operating room. This was a failure from the standpoint of the bronchoscopist, but the foreign body was removed and the patient's life saved.

Case 2.—A few weeks later another little girl, aged seven, was brought to me with the history of having inspired a persimmon seed one week before. She was apparently suffering no discomfort, the consultation being on account of a distressing cough that had developed. The x-ray picture showed the seed in the right bronchus not far from the bifurcation.

No attempt at removal was made until after the administration of a general anesthetic, when the seed was located through the tube with very little difficulty, but it was impossible for me to make any of my forceps grasp it. After ten or fifteen minutes I decided to do a tracheotomy, hoping to get hold of the seed with a pair of uterine forceps which I had straightened but which were not long enough to reach through the mouth. When the tracheotomy was completed, I opened the wound with retractors and during a fit of coughing the persimmon seed came out. I had evidently loosened it in my effort to remove it. I was astounded that anything so large could penetrate so far into the bronchus.

The patient returned home in one week in first-class condition. This represented another bronchoscopic failure, but again the foreign body was recovered.

Case 3.—This case offered much of psychological interest. A child three years of age five days before had fallen from a porch about six feet from the ground and when found was about five feet away from the porch and beyond a carpenter's trestle which was some three feet distant. The patient had been playing on the porch for half an hour before its fall whilst its father was reading, and fell just after the father had walked into the house. No one saw the accident, but heard the youngster scream and, finding it upon the ground, inferred that it had fallen on the trestle. The child was not unconscious and there was no hemorrhage, but from the time of the fall for two days they could not persuade the patient to take food or drink, and after that period when an attempt was made to swallow fluids they were regurgitated at any time from a few minutes to two hours.

Examination showed nothing abnormal and no evidence of injury to the mouth or throat. I explained to the father that there must be a foreign body in the esophagus and that he should take the child to a radiographer for a picture. This was refused on the grounds that nothing could possibly have been in the mouth at the time of the fall and the expense of the picture was unnecessary. I regretted my inability to do anything further without the picture. They left the office, but the father returned, stating that as I had been very kind, he would have the picture taken to gratify me.

The x-ray plate showed a coin just below the cricoid cartilage in the esophagus resembling a breast pin. The father then remembered that he had given the child a penny. The coin was removed very easily and the patient ate a hearty supper with relish that evening, suffering no ill effects. From the statements of the family, I expected to find some evidence of starvation, but there was none, showing that some fluids must have passed into the stomach.

Case 4.—My fourth bronchoscopic case was a woman, aged forty-seven, who thirty-six hours previously had swallowed a piece of ham bone which had lodged in the esophagus about one-third of its length from the cricoid as located by the x-ray. The patient had come one hundred and forty miles on a local train. Her suffering seemed to be intense. After giving a hypodermic

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

of morphin and atropin and anesthetizing the pharynx, the base of the tongue and the epiglottis with cocaine, I found a piece of bone which seemed to be firmly imbedded almost transversely, due, I think, to an attempt to push the bone into the stomach with some instrument before she reached me. By making pressure on the esophageal wall, I was able to loosen one angle of the triangle and catch it with my forceps and remove it with very little traction. The bone was triangular in shape, each side being about twenty millimeters in length, the angles being very sharp and cutting.

This patient was much prostrated for twenty-four hours, but recovered rapidly after that and returned to her mountain home the third day.

OTHER CASES

Dr. Jervey, in an interesting paper last June, called attention to a number of freak cases, where the foreign body was located by the roentgenogram in one bronchus and later removed from the other side, etc. Whilst I have never had any quite so extreme as Dr. Jervey's, I recall a little girl who came in, stating that she had swallowed a pin and that it was sticking in her throat. The x-ray picture revealed the pin down about two inches in the esophagus with the head down. We passed the tube to the cardiac orifice under general anesthesia, but failed to find a trace of the pin. The child vomited profusely while working with her. However, she was apparently relieved, but in one week returned, asking me to remove the pin from her throat, stating that she would do so herself if grandma would permit.

Examination showed the pin point sticking in the upper portion of one tonsil with the head in the naso-pharynx.

Another patient had a small fragment of chicken bone in the esophagus located just below the cricoid cartilage with the x-ray, but it was never found. The tube was passed daily for three days, when the patient insisted it had been dislodged while eating and the x-ray no longer showed it.

Only last week a baby, twenty-two months old, with a piece of chestnut in the trachea was brought to me. There was difficult trachea was brought to me. There was difficult breathing. The piece was located with the tube and looked like about one-fourth of a chestnut kernel. After using suction to remove the mucus I could not find the foreign body, but the child's breathing was normal. The x-ray the following morning failed to show it and there has been no discomfort since. I must have removed it with the suction, but where it went, I do not know.

My experience has been limited to twenty cases, consisting of two cockle burrs, four grains of corn, five coins, two of which were half dollars, two pieces of tooth pick, one jack stone which went on down the esophagus when I endeavored to grasp it and passed through the intestines, and two fish bones, but none has afforded the varied interest of the first five cases here reported.

To the volumes that have been written upon the subject I can add nothing. What impresses me most is the law propounded by Killian in his first paper on the subject in this country when he said:

"The extraction of foreign bodies is a subject in itself. No general rule can be laid down, but each case is a law unto itself. It depends upon the character of the foreign body, its position and the condition of the neighboring structures. The whole mechanism of extraction often requires thorough deliberation, and experience is most advantageous." (G. Killian: Trans. A. L. R. O. Society, 1907.)

Discussion follows paper of Dr. Carpenter, page 455.

## FORTY FOREIGN BODIES IN THE LUNGS, ESOPHAGUS AND INTESTINES*

BY E. W. CARPENTER, M.D.,
Greenville, S. C.

This study is presented, first, in the hope that it will impress its readers with their large responsibility in recognizing these cases and the necessity of promptly investigating them; and secondly, to call to their attention the fact that this report is confined to cases in the boundaries of South Carolina.

If one man working quietly in a small community has seen this number of foreign body cases from so limited an area, then there must be a large number of unrecognized cases in our midst. The technic of investigation is difficult and must be learned on the living subject. Much can be done by practice on the human cadaver and the dog, but the problems involved present great divergence when applied to an animated subject.

The mortality in the study and removal of foreign bodies should be very low. The average case incurs absolutely no danger to life if conducted with reasonable care. The end results of the vast majority of cases of foreign bodies when not removed is death, either from mechanical obstruc-

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

| Name | Age | Object | Location | Time in Situ | Type of Oper. | Result | Complication and Remarks |
|---|---|---|---|---|---|---|---|
| 1. E. S. | 8 yrs | Clove | Trachea | 3 hrs | High | Cure | The epiglottis was elevated; violent cough expelled clove. |
| 2. J. L. | 1 yr | Grain of corn | R. B. | 10 hrs | High | Cure | Corn fragile and broke frequently in attempt to extract it. |
| 3. A. B. | 18 yrs | Safety pin, open | Esophagus | 7 days | High | Recovery | Pin exposed in esophagus; patient transferred to hospital. Dislodged after x ray and passed into stomach. Recovered in stools 6 days after. |
| 4. R H. | 18 mos | Nut kernel | L. B. | 30 hrs | High | Cure | Walnut. |
| 5. W.W.W. | 30 yrs | Corn husk | L. Sec. B. | 9 days | High | Cure | Grain of corn coughed out in 24 hrs. Cough continued and a piece of husk 1½ to 2 mm. removed. The cough ceased promptly. |
| 6. T. J. E. | 5 yrs | Watermelon seed | R. B. | 3 days | High | Cure | Violently resisted; subglottic edema. Intubated. |
| 7. J. P. | 6 yrs | Corn | L. B. | 5 hrs | High | Cure | |
| 8. W. | 2½ yrs | Straight pin, 1¼ in. | L. B. | 24 hrs | High | Cure | Subglottic edema and bronchitis. Intubated. |
| 9. E. B. | 7 yrs | Nail, 2 in. | R. B. | 30 hrs | High | Cure | |
| 10. P. R. | 3 yrs | Lead ball | L. B. | 5 days | High | Cure | Large circumference and difficult to grasp. |
| 11. M. L. | 20 yrs | Straight pin | Duordemum | 3 days | None | Recovery | Located with x-ray. Expelled in 6 days. Complained of pain on swallowing. |
| 12. J. P. | 6 yrs | Grain of corn | L. B. | 6 hrs | High | Cure | |
| 13. H. P. | 7 mos | Safety pin, open, point up | Esophagus | 14 hrs | Pushed into stomach. Gastrotomy | Cure | Examination with esophageal speculum caused great shock. Small tube substituted. Trachea collapsed with small speculum in esophagus. |
| 14 R. D. | 4 yrs | Grain of corn | L. B. | 8 hrs | High | Cure | Subglottic stenosis for 48 hours of moderate severity. Left chest very tympanitic. |
| 15. F. F. | 2 yrs | Peanut kernel | L. B. | 3 days | High | Cure | Small larynx, tight tube. Intubated. Severe bronchitis. Extubated in 48 hours. |
| 16. H. N. | 1 yr | Green string bean | R. B. | 6 hrs | Low | Cure | Tube could not enter main bronchus. Bean about 1 inch. Beyond end of scope was grasped with forceps. |
| 17. T. | 19 mos. | Grain of corn | R. B. | 2 weeks | High and low | Death | Lung filled with pus. Scope passed through subglottic area with difficulty because of infiltration. Respiration immediately suspended. Low operation; grain of corn easily extracted; flood of pus deluged field. Respiration re-established. Intubation tube introduced; tight fitting; heart immediately stopped. I should have left tracheal wound open and not used the O'Dwyer tube. |
| 18. W. M. | 17 mos | Corn bread crumbs | Diffused through bronchi | 2 hrs | High | Cure | Respiration very shallow before operation and patient limp; no breath sounds over chest. Quantity of thick, ropy mucus with crumbs of corn bread removed. Free respiration with noisy crying established. |
| 19. A. G. | 3½ yrs | Lima bean | Orifice R. B. | 48 hrs | High | Death | Skin of bean peeled off easily; bean was softened. Broke away in trachea. Cyanosis and death instantly. |
| 20. M. | 5½ yrs | Said to be coffee bean by another physician | R. lung | 10 days | High | Cure | Cyanosis and impending death on admission. This was a second-handed case. I removed quantities of mucopus; re-established easy respiration. Pneumonia present. Did not find a foreign body. |
| 21. F. H. | 5 yrs | Lead buliet | L. B. | 2 weeks | High | Cure | Bullet 32½ mm. circumference difficult to hold in grasp of forceps. |
| 22. H. | 2 yrs | Open safety pin, point up | Larynx | 2 hrs | High | Cure | Point of pin up; hood just under vocal cords; grasped and wriggled through cords. |
| 23. H. | 13 mos | Not known | | 6 weeks | High and low | Death | No investigation permitted until six weeks after choking spell because only symptom was an occasional hacking cough; tracheal mucosa greatly swollen and tube fitted tightly; respiration ceased when it was introduced. Trachea opened, but tube could not be introduced. Quantities of pus present. |
| 24. N. R. | 12 yrs | 50-cent piece | Esophagus | 3 days | High | Cure | |
| 25. J. H. | 13 yrs | Cockle burr | Larynx | 3 days | High | Cure | Remarkable tolerance of larynx. |
| 26. J. M. | 55 yrs | Fresh pork | Pyloric end esophagus | 24 hrs | High | Cure | Ulcer of abdominal esophagus. Ulcer gave no previous indication of its presence; no subsequent trouble. |
| 27. V. R. J. | 46 yrs | 90 grains beef | Esophagus 4th dorsal | 30 hrs | High | Cure | Two previous choking spells. Dilated esophagus above obstruction. Lumen of esophagus narrow and rigid for about 1½ in. 4 yrs after patient is well. |

| Name | Age | Object | Location | Time in Situ | Type of Oper. | Result | Complication and Remarks |
|---|---|---|---|---|---|---|---|
| 28. B. R. | 6 yrs | Fragment ripe peach | Orifice R. Sec. B. | 48 hrs | High | Cure | Delivered through scope with sucking noise; fitted like a piston. |
| 29. D. | 4 yrs | Tin whistle | Esophagus sternal notch | 4 days | High | Cure | A previous attempt had been made in another city to remove the whistle with a Killian instrument which overrode it and persistently hid it from view. A Jackson speculum exposed it. |
| 30. E. T. | 58 yrs | Gold tooth plate | Esophagus above sternal notch | 2 hrs | High | Cure | 38 by 21 mm. with three sharp hooks. |
| 31. O. L. P. | 40 yrs | Beef | Esophagus 9 in. below teeth | 3 days | High | Cure | Ulcer at site of obstruction. Emaciated, chronic indigestion before incident. Ulcer treated and healed. General health greatly improved. |
| 32. J. | 18 mos | Fragment peanut shell | Trachea | 4 hrs | High | Cure | Hand suspension with Jackson speculum. Forceps passed through cords for about 2 in. Shell grasped and extracted without a tube. |
| 33. M. L. | 14 mos | Raw peanut kernel | R. B. | 3 days | Low | Cure | Intubated 15 hours after bronchoscopy. Raw peanut kernel being very brittle, I feared attempting to pull it through cord and opened trachea; tracheal wound approximated and I decided to intubate when stenosis devloped. Intubate when stenosis developed. Inwound healed by first intention. |
| 34. F. W. | 16 yrs | Straight pin | Esophagus behind criscoid | 24 hrs | High | Cure | Head down against anterior wall; point imbedded in post wall. |
| 35. D. M. | 11 mos. | Pine tree bark | Trachea 1½ in. below cord | 48 hrs | High | Cure | Hand suspension; extraction without tube. |
| 36. R. S. | 3 yrs | Watermelon seed | Lung | 4 mos | | Recovery | Instrumentation not permitted. Patient coughed out seed 4 mos. after. |
| 37. C. S. | 21 yrs | Half peanut shell | R. B. | 2 weeks | High | Cure | This shell was rolled into a small rod and was very soft and difficult to dislodge. |
| 38. D. | 3 yrs | Safety pin, point up | Larynx | 3 weeks | High | Cure | Hood end between vocal cords. First attempt to remove followed by hemorrhage, child vigorously resisting. Under light chloroform anesthesia point thrust through one cord when a fresh hold permitted turning and extraction. |
| 39. J. P. | 6 yrs | Watermelon seed | L. B. | 5 hrs | High | Cure | |
| 40. C. Y. | 3 yrs | Grain of corn | Trachea | 3 days | High | Cure | |

tion, erosion into vital structures, direct or indirect infection.

In my experience three foreign bodies have been coughed up, Cases 1, 5, and 36. In the first case this occurred after the child was in a reclining position with the larnyx suspended. In the second case, while the grain of corn was expelled, a minute portion of the husk remained which caused incessant cough for nine days until it was removed. In the third case, a watermelon seed was coughed up four months after being inhaled. I believe that most of the subjects of this study would have died sooner or later if they had been left to their fate.

The usefulness of per oral endoscopy is not limited to the removal of foreign bodies. There are many obscure conditions which physicians meet in daily practice which could and should be brought into the light of a bronchoscope. Ulcers of the trachea and esophagus, granulations, papilloma, tumors, asthma, anurisms, abscess cavities, strictures, malignant growths, diverticula, etc., are coming into the clear light of an intelligent diagnosis more and more.

I do not think that every doctor should possess himself of a bronchoscopic outfit, but it is essential that every one should promptly recognize these cases.

## SYMPTOMS OF FOREIGN BODIES

In most cases there is a history of a definite choking spell, varying in intensity from a transient cough or a constant hack to violent attacks of dyspnea. Jackson has truly said that cough was the watch dog of the lungs, but occasionally we find a case which is said not to have coughed after the passing of the first paroxysm. I have noticed in many cases a wheezing which did not bear a definite relation to the size or location of the foreign body.

The nature and size of the foreign body will determine the presence or absence of physical signs in the chest. If the patient is seen early after an irritating substance, like a peanut kernel, has been inhaled, moist rales are heard in the neighborhood of the foreign body. If a longer time has elapsed, both sides of the chest may be filled with moisture. If the offending substance is large enough completely to obstruct a bronchus, then breath sounds are absent in the part of the lung supplied by that bronchus. Sometimes a foreign body may act like a ball valve, permitting air to accumulate distal to it until the cut-off part of the lung becomes tympanitic (see case 14).

After an expert physical study of a chest has been made one is often without definite indications of a foreign body. The study of a case is never complete without an x-ray plate. Often all the above means fail and one has to resort to the scope without having any definite information as to the nature of the foreign body or its location.

### ANESTHESIA

Any child or adult who can be controlled and kept from over-violent resistance should never have a general anesthetic; neither should any patient who has a dyspnea. When a general anesthetic is administered the voluntary muscles of respiration are put out of action, and it is through these muscles that the patient is kept alive in the presence of severe dyspnea.

The most difficult ages to handle are from 6 to 15 years. Often they sulk or are overcome with fright and can not be controlled. Under these circumstances as much chloroform should be used as is necessary to keep the patient quiet. Never push an anesthetic under any circumstance to the stage where the cough reflex is abolished.

In very young infants and children I do not use any anesthetic, not even cocain, unless it be to apply a minute quantity to the depths of the lungs to overcome cough under certain circumstances. In adults 10 % solution of cocain is usually sufficient when applied in the larnyx two or three times.

### POST-OPERATIVE DYSPNEA

In this study five cases had to be intubated because of post-operative dyspnea. The reason for this is twofold: (1) inflammatory infiltration and (2) injury from over large tube, or trauma inflicted on a struggling subject. The obstructing lesion is usually located high up in the trachea.

The more experience one has the smaller the calibre of the bronchoscope he can work through. The larger my experience grows the less I am inclined to open the trachea for the removal of foreign bodies or for the relief of dyspnea. I believe that intubation is a better procedure for the relief of subglottic edema than tracheotomy, when the lesion does not extend beyond the reach of the intubation tube.

### REMARKS

Case 3.—Esophageal spectulum revealed pin open and point up. Patient sent to hospital for removal. Three hours afterwards x-ray revealed pin in stomach.

Case 5.—A grain of corn was expelled by coughing 24 hours after inhaling it, but cough, which was constant day and night, continued for 8 days. Morphin at night gave but little relief. Thinking to find a fragment of the grain of corn, the patient was scoped, and a small fragment of husk was removed from Sec. L. B. Patient did not cough again after leaving the table.

Case 6.—Edema, probably traumatic.

Case 8.—Edema, and bronchitis probably from septic pin, as it had been repeatedly used in a lady's veil and had probably been held in the mouth repeatedly.

Case 13.—Pin was first exposed with long narrow speculum, baby collapsed, respiration and heart stopped and my assistant counseled desistance. I discovered that the speculum had caused the trachea to collapse, thus shutting off respiration. This had never occurred to me before, and I was not on the look out for it. A small tube exposed the pin after the child reacted, but it slid merrily down into the stomach.

Case 14.—The extreme tympany in this chest and the swollen mucosa around the grain of corn led me to think that the corn

had acted like a ball valve, admitting air and imprisoning it.

Case 15.—Edema in this case was probably due to the intensely irritation quality of the peanut oil or, as Jackson has called it, arachitic bronchitis.

Case 17.—Some authorities do not believe that the heart or respiration is stopped by stretching of the subglottic area, but in this case respiration stopped after passing a tightly fitting tube through this space and was resumed on withdrawing the scope. Through a tracheal incision the foreign body was readily removed and was accompanied by a flood of pus which threatened drowning. This was the first instance where I had opened the trachea for removal of a foreign body, and I should have been content to have left the case alone at this stage. Thinking to encourage healing of the tracheal wound, I decided to slip in an O'Dwyer tube. The edema was considerable and tube tight fitting. As soon as the tube was seated the heart ceased to beat and could not be aroused. In a few cases since this I have been content to trust to the tracheal wound for breathing and leave it absolutely alone except to keep it scrupulously clean.

Case 20 was one of threatened drowning. I believe the future holds a field of usefulness for the bronchoscope in similar conditions.

Case 23.—Similar to case 17 in respect to cessation of respiration on introduction of scope. After respiration was re-established I could not persuade a 5 mm. scope to re-enter the trachea. Trachea incised, but the tracheitis was so intense that a 5 mm. tube would not enter. This was previous to the manufacture of a 4 mm. scope. Another physician attempted to introduce the tube through the high and low route with similar results.

SUMMARY

| | |
|---|---|
| Vegetable substance | 23 |
| Animal | 3 |
| Mineral | 13 |
| Not identified | 1 |
| Deaths (Cases 17, 19 and 23) | 3 |

DISCUSSION

Papers of Drs. Moore and Carpenter.

*Dr. Robert C. Lynch, New Orleans, La.*—First of all, Dr. Carpenter's paper impressed upon me the large number of foreign bodies that occur in the left bronchus in South Carolina. It is rather unusual for foreign bodies to lodge in the left bronchus. Among other cases, we had one in which five or six attempts were made to remove a tack from the bronchus which the x-ray definitely showed in the right bronchus. We could never see the tack. It was in the left bronchus. The mistake was in never getting into the left bronchus. The work on dogs and animals in learning to do bronchoscopy is not satisfactory. Experience must be gained from clinical work. The mortality is unusually low, I think one-half of 1 per cent, not more than 1 per cent at the outside limit. We should never forget that the patient is just as likely to swallow two foreign bodies as one and no bronchoscopy is complete until after the first foreign body is removed, when the bronchoscope is reintroduced to be certain that the second foreign body is not there. By this you may save your patient from the accidents that have been reported by Jackson and others. I had three instances where one watermelon seed was insufflated into the trachea and we removed three seeds instead of one. In the diagnosis of foreign bodies the diagnosis is at the time of insufflation, or at the time of accident, and is usually made for you by the patient or the family of the patient. The only instances where the diagnosis is hard to make is where the accident occurs to the child when he or she is alone and for fear of chastisement or scolding on the part of the parents will not tell what happened. In nearly every instance of retained foreign body in the bronchus over a long period of time this history has prevailed. The child has been afraid to tell the parent what has happened. We have had five of such cases, screws, pins, tacks and a staple, in which the children gave this history. These articles remained in the lung from two to nine years and finally were discovered by accident by going to some inquisitive man who took an x-ray picture. These cases have been treated for typhoid fever and pneumonia, and nearly all have been treated over a period of time for tuberculosis. Tacks were the cause of the tuberculosis. One of the principal symptoms of a floating or loose foreign body in the trachea is what might be termed the foreign body click, which can be distinctly heard during quiet or forced respiration. This refers particularly to watermelon seeds, kernels, peanuts and material of that type. There is a certain click in the respiration which is perfectly diagnostic, and which gives you the additional information that the foreign body is moving up and down the trachea. Therefore you want to guard yourself in the progress of the removal. I differ from Jackson and the speaker

on anesthesia. I use a general anesthetic in every case of bronchoscopy except where the dyspnea is very marked and the patient must use extra muscles of respiration. Then a general anesthetic is contraindicated, but in every other case we give nitrous oxid oxygen with a little ether. We have no cases of edema to report from struggling, etc. In all babies and young children I suspend the cases first, grease the larnyx, put in the bronchoscope and if the foreign body is deep in the bronchus remove it and prepare the passage of the larnyx for the passage of the bronchoscope, as one does the anus or meatus for the urethra. This does away with traumatism and the necessity of treatment for the larynx on that account. The subsequent dyspnea that follows the bronchoscopy is due many times to the excessive secretion in the bronchial tree as the result either of the presence of a foreign body or the manipulation necessary for its removal. It gives rise to intense dyspnea, marked cyanosis and those symptoms which you would conclude were due to subglottic edema. If the bronchoscope is passed into the trachea again and this thick secretion sucked out with a vacuum apparatus, the dyspnea will entirely disappear and an intubation be obviated. In the cases where subglottic edema is actually marked and demonstrated under the suction apparatus I prefer a tracheotomy to intubation. Chloroform is a dangerous anesthetic in these cases because we know that chloroform is tremendously more toxic than ether. I would advise against the use of chloroform in any of these cases. Ether is very much better. In none of these cases should preliminary atropin or morphin be administered in any work on the bronchial tree. They all have disturbances of respiration as the result of the administration of atropin and morphin. In working with suspension and the deep anesthesia necessary for intratracheal surgery and intralaryngeal surgery, those cases which have morphin and atropin do worse from a respiratory standpoint. There is depression from morphin.

Foreign bodies are coughed up. Some have been removed under suction. Those that are floating may be removed by spreading the vocal chords apart and allowing them to be coughed out without further instrumentation through the larynx. Protracted, unexplained coughing in a young or old person demands an x-ray picture of the chest. We had a little boy who had stuck into his trachea the top of a sample jar, which remained in his right bronchus for five years. He had been treated for pneumonia and tuberculosis. Finally some one took an x-ray and the jar top was seen and removed without trouble. Another case was that of a lady who had applied to a dentist for false teeth. An impression was made of her mouth with nearly fluid plaster. In putting the spoon in there her head was tilted back and the soft plaster ran into her trachea. She coughed incessantly for five years. We removed five pieces of plaster from her bronchus and the cough disappeared. It will disappear almost instantly on the removal of the foreign body.

The treatment of lesions of the trachea and bronchial tree is becoming almost another specialty and one or two men in this country are devoting themselves almost entirely to this type of work. I think this is narrowing it down too much.

Suspension is most valuable in an impacted foreign body in the upper esophagus; it gives you two hands to work with, one hand to catch hold of the foreign body and the other hand to relieve the impaction and do away with the traumatism. I would advise it in every instance. Every case of esophageal examination should be guarded most carefully for esophageal shock, which is most intense and distressing. The mere passage of the esophagoscope will produce symptoms of the most grave character from shock. This has been noted before and is not new, but must be brought to your attention. The suction apparatus will remove foreign bodies of the peanut type and chewed up foreign bodies. The patient has a mouthful of peanuts chewed up, the mother grabs for the child because it has peanuts and its first effort is sucking down of this material. This gives multiple foreign bodies by the handful. Suction will remove that material and debris much better than forceps. You remove one large piece from bronchial tree and suck out the rest. In Dr. Moore's exhibit to those who use bronchoscopy the per oral route is the route of election in every instance. One can do a thousand times more through the mouth than through any tracheotomy wound. You have more latitude in motion and it is more direct. The continental men maintain that any child under five should be tracheotomized for the removal of foreign bodies. America stands pat on the per oral route. Where you must remove the foreign body, where the forceps are not right, or the equipment bad, tracheotomy is life-saving, but it is not the operation of election where we have efficient provision by other means.

*Dr. C. M. Miller, Richmond, Va.*—The matter of direct bronchoscopic work is certainly one that will engage the attention of all of us. It is the duty of the localities to encourage one man to go into this work and to let him get enough to be skilled in it. I do not pretend to be skilled in it and I have tried to encourage others to do it. My opinion is that a man should give much of his other work up and devote all his skill to it if he does it at all.

I had a rather interesting case some time ago. A child six years old was brought to me from the country, a short distance away. The parents said this child put a chicken wire staple in his nose yesterday. He was a very tractable child. I did not try to make him talk or would have made the diagnosis earlier. I examined the nasopharynx and passed a finger and there was noth-

ing there. Then the parent said something to the child and he tried to speak and replied in a very hoarse voice. He was very tractable to the laryngeal mirror and I saw the chicken wire staple with one leg above the vocal chords and another leg below it. I anethetized and picked out the wire staple. Each leg was one and a quarter inches and the spread of the legs was three-eighths of an inch. I put him in a benzoin tent and kept him there forty-eight hours. I vainly tried to hear from the child and doctor afterwards. I got the fee. I concluded that the child was perfectly well after going home, as neither his physician nor I heard from him further.

*Dr. W. T. Patton, New Orleans, La.*—I prefer a general anesthetic, for unless one is a genius like Dr. Jackson, the trauma and injury caused by removing a foreign body with local anesthesia is far greater than the danger from anesthetic.

I prefer general anesthetic for all cases, particularly the youngsters.

Dr. Lynch stated that the mortality should be about one-half of 1 per cent. It should be, and probably is, in his hands, but I doubt if it will be as low with most of us. Unfortunately we are not all equipped as well as we should be for this work and have not trained assistants, anesthetists and nurses, which means a great deal in bronchoscopy work.

Men in small towns are especially handicapped and certainly only a few men in each vicinity should attempt to do this work. It is much better to refer all work to one man and let him become expert, for there is not sufficient for many men to keep in practice, and practice on animals or cadaver is unsatisfactory.

*Dr. Carpenter (closing).*—I am not wholly opposed to the use of a general anesthetic, and whenever indications for its use present themselves I expect to employ it. In a very few instances I have used a few inhalations to overcome fright and violent resistance. In the great majority of cases an investigation for foreign bodies takes but a short time and I believe the patient should be spared the possible ill-effect of a general anesthetic.

If the foreign body should block respiration to the extent that the extraordinary muscles of respiration were needed, the patient would die while under a general anesthetic.

The esophagus is so extremely sensitive to instrumentation that shock often manifests itself, and if the patient is under a general anesthetic and shock supervenes, one has added fuel to the fire.

*Dr. Moore (closing).*—I do not believe that any of the men in the smaller towns take up this work from choice, but what are we going to do? The nearest man to whom I can refer a bronchoscopic case is one hundred and sixty-some miles, five hours' ride. Are we going to let these patients die? Most of them haven't any money. I do not think out of my twenty cases I have received five hundred dollars in fees. In my town I have trouble in persuading these patients to have an x-ray picture made on account of the expense, in many cases paying for the picture myself in order to have it taken.

Where there is a moving body in the trachea, especially with grains of corn, I think it is much better to do a tracheotomy, if the patient has to travel any distance to consult a bronchoscopist. Frequently the floating body will be expelled. If not, the chances of suffocation are less. Before I knew anything about bronchoscopy, I removed foreign bodies in this manner. If you send a patient away with a foreign body moving in the trachea you do not know what the result will be on the journey.

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# EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Fourteenth Annual Meeting, Louisville, Kentucky
November 8-11, 1920

## LOUISVILLE PLANS

When the Louisville physicians presented the attractions of Kentucky's metropolis as a convention city to the Council of the Southern Medical Association there were some who thought they were over-enthusiastic; but after an inspection of the meeting places, the hotels and the Louisville Armory, where the scientific and commercial exhibits will be held, the Secretary-Editor and the Business Manager are prepared to say that they have never seen before such ideal arrangements for a large convention as are offered at Louisville—not excluding Atlantic City, or the cities in the million or more class, where the meetings of the American Medical Association have been held. The leading hotels have auditoriums which can be darkened for lantern demonstrations, and they are grouped in a few blocks, near the Armory, where the general headquarters of the Association will be established; so that the 2,000 physicians who will attend the Louisville meeting can be together more than at the usual conventions of large medical associations.

Louisville is accustomed to handling large numbers of visitors, particularly at the spring and fall races, when it cares for 20,000 to 30,000 horse enthusiasts for several weeks at a time. The Louisville system of seeing to it that all visitors are provided with comfortable quarters during conventions is an ideal one, and no one who goes to the November meeting of the Southern Medical Association need fear that he will be deprived of any of the comforts of life that may be found in a modern city.

While Louisville has a number of large, modern hotels, and there will be 1,500 rooms reserved for visitors who attend the meeting of the Southern Medical Association, the hotels insist upon following the plan adopted by most cities, viz., making reservations only where two can go in a room. Those who plan to go to Louisville, therefore, should plan to go in pairs, and write in for reservations—two in a room; or at least with the understanding that if necessary another physician may occupy the same room, but not the same bed, during the meeting.

At the New Orleans meeting of the American Medical Association the section officers and others interested in the Louisville meeting met and discussed plans for the scientific sessions. The usual high standard of scientific work will be maintained. One of the special features will be a symposium on nephritis that will bring together all the sections for one-half day. Each section will have one or more representatives who will present papers upon the various phases of this disease which is of interest to every physician whether he be a specialist or a general practitioner.

The Louisville committees have practically completed all arrangements for the meeting and the section officers report satisfactory progress on their programs. There can be no question but that the Louisville meeting will prove that the Southern Medical Association is progressing in a way that was not dreamed of by

the enthusiastic physicians who founded it and who have felt that there was need for a great medical association in the South.

## LAY ANESTHETIST VS. THE PHYSICIAN

The American Association of Anesthetists met simultaneously with the American Medical Association in New Orleans in April. During the meeting much discussion was raised on the old, old question of lay anesthetists. The opinion seemed quite prevalent, as expressed by Dr. George W. Crile, of Cleveland, that the mere degree of doctor of medicine confers no moral right to give anesthetics. It is a specialty all its own, requiring an aptitude, peculiarly-fitted personality and careful training.

Although during the war the man-shortage was the greatest impetus for the increase of lay anesthetists, getting down to cold facts, the real factor now concerned is an economic one: the nurse or office assistant costs much less than the trained physician and is, therefore, more easily procurable. The lay anesthetist can be secured for so much less than the medical anesthetist that the latter is threatened with being put out of existence as a specialist unless some radical steps be taken to prevent it.

We have every reason to believe that we have not arrived at a state of perfection in anesthesia. Surely much is to be learned on the subject. Hence the question resolves itself into this: what type of person is most capable of advancing our knowledge of the art and science of anesthesia, the layman or the physician? Could a Simpson, Long, Morton or Wells have been developed from a lay anesthetist? Physiology and pathology are the basis of the study of anesthesia, and without them the work becomes merely a mechanical procedure. On the other hand, in fairness to the lay anesthetist, when she is a trained nurse, her work is often found most satisfactory. For instance, at the Mayo Clinic and at Crile's Clinic one sees nothing but nurse anesthetists. But those women are carefully trained for their calling.

The resolution passed at the New Orleans meeting follows:

"*Whereas*, The American Association of Anesthetists is committed to the advancement of the science and art of anesthesia in all that relates to the welfare of humanity, through the medical and dental professions; and,

"*Whereas*, The advances in medical science are making it increasingly clear that the administration of anesthetics is a factor of practically equal importance with diagnosis, treatment and operation; and,

"*Whereas*, There is an increasing disposition on the part of a few surgeons and hospitals to commit the administration of anesthetics to nurses, office assistants and others without adequate qualifications, exploiting such services to their commercial advantage, according to testimony adduced before this Association, thus jeopardizing the health and welfare of patients and increasing the death rate in operations; and,

"*Whereas*, Anesthesia is in a state of evolution, and those who advocate lay anesthesia would defeat any further progress in this branch of medicine; therefore, be it

"*Resolved*, That the American Association of Anesthetists places itself on record as unalterably opposed to the employment of lay anesthetists, nurse anesthetists, and all other types of anesthetists who shall not have been graduated from recognized medical or dental colleges and have been licensed to practice medicine or dentistry. Be it further

"*Resolved*, That the American Association of Anesthetists will inaugurate and prosecute legislation to protect the medical and dental professions and the public from such inadequately educated and trained anesthetists whenever such action is necessary."

## THE DIVINE COW

This is called the horseless age, and the beasts of burden that have helped man for centuries are no longer needed when the motor-driven automobile, truck and tractor can take their place. The dog, as a protector, and the cat, as a household pet, are fast losing their prestige. Even now one city (Denver) is considering legislating cows, goats, sheep, and even horses, out of its corporate limits. Meat

is no longer considered an essential article of diet, and as men become better educated they will consume less of this form of protein; so that the pig, the sheep, the goat and beef cattle are not secure of places in the needs of man. But the cow, as the provider of an essential article of food, is the one animal that is necessary to human life; and, as the science of diet and nutrition develops, her importance to the welfare of the world becomes more apparent.

In Biblical days "the land of Canaan flowing with milk and honey" was the dream of the oppressed Israelites. As we have not been able to improve upon some of the laws of hygiene that have come to us from Moses and Aaron, so we have not in the 6,000 years that have passed learned of a more wholesome diet than milk and honey. The ancients did not know anything about proteins, carbohydrates and fats; nor had they any knowledge of vitamins or of the chemical needs of the body. They found from practical experience that a diet in which milk was an important constituent was the one that gave the highest degree of physical comfort, and that in promoting health it increased happiness. In the vision of the Promised Land which Moses saw before he was "gathered to his fathers" he beheld "cattle grazing in green fields." The cow was regarded by the ancients as essential to the health and prosperity of a nation; and they made sacrifices of their calves and children, their most valuable possessions, as evidences of their devotion to their gods. Our word pecuniary comes from the Latin *pecus*, meaning cattle, which was the medium of exchange and the basis of wealth.

The Greeks were more advanced in civilization than the Hebrews. They did not know anything of the principles of nutrition, but they did know the value of milk in diet. More than 2,000 years ago Araetus, an Athenian, sent his tuberculous patients to the mountains and he said of the treatment of tuberculosis: "milk sufficeth both as a food and a medicine." He also spoke of "fresh laid eggs" in the diet of tuberculous patients. Up to this day we have not improved much upon this treatment; but we have learned something, a very little, of the reason why milk is so important in the prevention and treatment of tuberculosis.

### THE COW, THE GREAT PROTECTOR OF MANKIND

The cows of the world by giving their milk to mankind save more human lives and prevent more disease than all other agencies for the prevention of illness in human beings. The cow provides the one article of nourishment that meets all the nutritional needs of the human body. Man can live and thrive on milk alone; and milk, or some of its products, butter and cheese, have been found to be essential to perfect nutrition.

Since milk contains on the average proteins 3.2 %, carbohydrates 4.88 %, and fats 3.64 %, and the lime and other mineral salts necessary for producing energy in the human machine and for its growth and repair, it was formerly supposed to provide merely the chemical constituents of the body in such shape that they could be easily digested and assimilated. However, recent investigations have shown that milk contains vitamins, the exact nature of which has not been determined, that are necessary for keeping the body in a perfect state of nutrition. More recently MacCollum has shown by experiments upon animals which live on about the same diet as human beings that though they are given the right proportions of pure proteins, carbohydrates and fats, they become emaciated and die if they do not get butter fat, or the fat from the yolks of eggs. He has been able to extract a substances which he calls "Fat Soluble A,"

which, he concludes from these experiments, is essential to the well-being and life of human beings. Through thousands of years of practical use and through scientific investigations we know that the cow is next to the human mother in supplying nourishment to infants, and that she provides the one essential food to human beings of all ages.

### CARE FOR AND PROTECT THE COW

Our docile bovine friend should be cherished and protected almost as one of the family, because if we do not, the life-giving beverage which she provides may become the medium of transmitting deadly disease. The food which is nutritious to us has an equal value to many forms of bacteria, and of all foods milk is the most easily contaminated. The herd of cattle which provides nourishment for thousands of children, if not properly cared for, may develop tuberculosis and the milk may be the medium of introducing tubercle germs into the glands of children, where they may remain latent only to develop years afterward into a serious form of tuberculosis. If the cow's udders are not kept clean, her milk becomes dangerous. If the milker is a typhoid carrier, or is nursing a case of typhoid, he or she may contaminate the milk, and thus infect others. Many other diseases may be transmitted in milk, so that it behooves us to be clean and pure when dealing with our friend, the cow, lest we suffer for our carelessness.

We should express our appreciation of the cow, not by taking her into the bosom of the family as do the people of some European countries, nor by worshipping her as do certain natives of India, but by providing for her in a way that will keep her in the best possible condition for performing her God-given function of furnishing pure, wholesome milk. It is not only gratitude, but self-preservation, to give the cow the best possible food and to have her environment such that she will get the most out of life and at the same time increase and improve her progeny.

*Moore and Talbot: Diseases of Nutrition and Infant Feeding. Macmillan, 1919, p. 166.

### A COW FOR EVERY FAMILY

A cow for every family is the greatest dietetic need of every nation The decrease in milk cattle in the countries of Europe is one of the dire curses of the World War because for lack of milk, hundreds of thousands have perished, and many more will perish, from tuberculosis and other infectious diseases that prey upon the bodies of poorly-nourished people. The United States is better off in respect to milch cows than any other country; but it is amazing that even on the farms there are so many families that do not keep a cow. Milch cattle should be exempt from taxation, as a necessity of life, and every man who has ground enough on his lot to provide for a cow properly, should be encouraged in every way possible to keep one. Plenty of milk for the family is the surest way to keep well. Tuberculosis, pellagra and many other diseases will not develop in the person who takes plenty of milk and who is otherwise well nourished.

The cow may not be as graceful as the gazelle; she can not sing like a bird; she may not be so swift as the horse; but she is the most useful animal known to man. Throughout the years of her adult life she dispenses without protest a nectar that spreads good cheer, health and happiness among those who will drink freely of it. The cow is not human, but she is divine in her origin, and divine in the miracle of saving human life. Therefore, we sing her praises! May her kind increase and spread over the earth! Next to woman and her children, the divine cow is God's best gift to man.

## PUBLIC HEALTH WORK IN MISSISSIPPI

The report just issued by the Mississippi State Board of Health, covering the period of 1917-1919, records wonderful achievements in the prevention of disease. The opening chapter, giving a historical sketch of public activities in Mississippi from 1910 to 1919, is particularly interesting. It shows that in 1910 the great State of Mississippi expended $8,000 for protecting its citizens from disease; but there has been a gradual awakening of the public health conscience of the law-makers in the State until in 1919 $47,600 was appropriated for use by the State Board of Health. That the Legislature of Mississippi regards money invested in the prevention of disease as profitable is shown by the fact that at its last session an appropriation of $155,000 per year was given to the State Board of Health. In addition the same Legislature provided $1,048,000 for buildings and permanent improvements of the State Tuberculosis Sanatorium, with an estimated appropriation for its maintenance of $300,000 a year. In this it far exceeds the appropriations for tuberculosis prevention in any other Southern state; and the example of the Mississippi Legislature might well be emulated by other law-makers.

While the appropriation of money is a *sine qua non* for public health work, and generally speaking, the good that a health agency accomplishes is in direct proportion to the amount of the funds at its disposal, this is not always true, because there may be mismanagement by public health officials. In Mississippi, however, the results achieved have far surpassed that which was to be expected from the limited funds appropriated for public health work. Fortunately, because those who are responsible for the wonderful development of public health work in Mississippi realized that the accurate vital and mortuary statistics are fundamental in the efforts to prevention of disease, it is possible to measure in terms of lives saved and of illness prevented, the accomplishments of those engaged in protecting the citizens of Mississippi from the ravages of disease. In this connection it may be well to mention that one of the great achievements of the Mississippi State Board of Health has been to place a state, in which the population is largely rural, with a large proportion of negroes, in the Registration Area for deaths.

The reduction in the number of cases of typhoid fever, malaria and pellagra in Mississippi has repaid the State many times over the money spent in public health work. The number of typhoid fever cases reported was reduced from 6,116 cases in 1915 to 5,141 in 1918; the number of cases of malaria fell from 150,779 in 1916 to 105,783 in 1918; while the number of the pellagra victims decreased from 15,831 in 1915 to 8,340 in 1918.

### INTENSIVE COUNTY HEALTH WORK

The reports of several counties in Mississippi, in which intensive public health work has been done, are striking; and they foretell what can be accomplished by extending it into every county in a state, and into every state in the Union. For instance, in Pearl County the number of cases of typhoid were reduced from 52 in 1914 to 17 in 1918, and during the same period the deaths from this preventable disease decreased from 8 to 2. In Jones County a like result was obtained, the typhoid cases having been reduced from 248 in 1914 to 50 in 1918, while the deaths from that source decreased in the same period from 8 to 2.

The reports from counties in which intensive work on malaria, co-operating with the International Health Board, was undertaken indicate what a simple task it

would be to eradicate malaria from the United States. For instance, in Sunflower County, the survey that was made before malaria prevention by quinin administration was begun, showed that 40.22 per cent of its population of 9,000 had attacks of malaria, and probably chronic malaria, during the last twelve months before treatment was begun. The survey following the first twelve months after treatment showed only 4.42 per cent affected.

In hookworm prevention the results also have been very effective. For instance, a graphic map of Harrison County before a campaign against soil pollution shows the location of thousands of homes with insanitary privies, while on the opposite page is shown the same county with every one of its homes having approved sanitary latrines. What this will mean to Mississippi when the work is extended over the state is shown by the fact that in 32,261, 70.8 per cent of the inhabitants in five counties, were examined for hookworm, 12,652, 39.6 per cent, were found to have uncinaria ana in their feces. Ninety-nine per cent of these were given the first treatment.

### A GREAT LEADER

It is not possible within the limits of an editorial to review all the activities of the various bureaus of the Mississippi State Board of Health as mentioned in its report; but it is a record of achievement more glorious than that ever won on battle fields, because it relates to the saving of human lives and not to their destruction. Mississippi may well point with pride to its development in the past decade; but no accomplishments of its citizens can compare with that of its State Board of Health. Like other great achievements on a large scale, there has been in Mississippi a great leader to inspire his associates with devotion to a worthy cause, and that man is Dr. W. S. Leathers, the executive officer of the Mississippi State Board of Health. He has shown his wisdom by associating with him a group of able and enthusiastic sanitarians, to whom great credit is also due for the remarkable record that has been made by the Mississippi State Board of Health.

It is probable that no man in public health work in the United States has had more active support on the part of the medical profession than Dr. Leathers; and the results obtained also show that he has been able to secure the co-operation of the public. Mississippi is justly proud of Dr. Leathers, as was evidenced by the applause which was elicited at the recent meeting of the Mississippi State Medical Association when a prominent surgeon referred to him as "the State's most useful citizen." Mississippi is also pardonable in her pride in the other men in public health work in that State; and the JOURNAL rejoices that they and other sanitarians are solving the public health problems that have interfered seriously with the industrial and agricultural development of the South.

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## NO HOPE FOR A DEPARTMENT OF HEALTH WITH A DIVIDED MEDICAL PROFESSION

With both parties pledged to the establishment of a national department of health in 1912 and again in 1916, and with practically all the medical organizations in the United States having endorsed the plan, why has not a department of health been established before? Some would lay the blame to the combined attack of patent medicine interests, the osteopaths, the Christian Scientists, and the quacks and cults of every kind who know that with a public enlightened in the methods of preventing and curing disease, their business would suffer. It is surely a fact that all the forces opposed to the organized medical profession fought the Owen bill with all

their might and money. That they influenced some of the senators and congressmen is certain, because there was one Christian Scientist in the Senate who fought the measure until it was defeated. We can not hope to quiet this opposition to any legislation that proposes to protect the health and lives of the citizens of the Nation; and we must expect and be prepared to fight to a finish all the enemies of organized medicine.

Some have claimed that the hostility of the United States Public Health Service, then called the Marine Hospital Service, was the real factor in killing the Owen bill that provided for a national department of health. How much effect the opposition of some prominent members of the Marine Hospital Service had in the defeat of the Owen bill can not be estimated, but it is a fact that many members of the Public Health Service were opposed to the measure because they believed that it did not adequately provide for the personnel in the already established Bureau of Public Health. This opposition can be changed into a powerful support by protecting the personnel of the U. S. Public Health Service; and by providing for its expansion, placing it on the same basis as the War and Navy Departments.

### THE U. S. PUBLIC HEALTH SERVICE THE NUCLEUS FOR HEALTH DEPARTMENT

The United States Public Health Service has in its personnel many able sanitarians who have done wonderful work with the inadequate support that they have received from the Government. There should be many times as many men, with proportionately enlarged facilities for effective work, as are now available in the U. S. Public Health Service. Their pay, rank and other emoluments should be equal to, and as permanent, as that of the officers of the Army and Navy. There should be as many Major-Generals, Brigadier-Generals, Colonels, Majors and Captains in proportion to the number of officers as there are in the Army and Navy.

The U. S. Public Health Service should not be militarized in the matter of "fours right" and in the invidious distinctions in rank as have been practiced by some small men in the regular Army and Navy, but they should have the rank and the pay of the fighting branches of our Government. Indeed, the men who are engaged in public health work are fighting the battles of the Nation. They are fighting foes that the unaided eye can not see, but they are enemies no less real than were the Germans with their deadly machine guns in the Argonne Forest who mowed down the youth of America by the thousands. The men who fight plague, cholera, tuberculosis, typhoid fever, smallpox, pneumonia and other infections must have as high a type of courage, and as pure patriotism, as the brave men who faced the fire of shot and shell in the defense of their country. The men of the United States Public Health Service who have gone into plague, cholera, yellow fever and infected cities and fought and conquered our enemies are heroes as much as the men who fought in France; and in the legislation providing for a national department of health they should be protected and encouraged as much so as those who wore the khaki in the recent war. They should be made to feel that the proposed national department of health will not be inimical to their service; but that it would vastly enlarge their opportunities and at the same time increase their pay and prestige. Indeed, the United States Public Health Service should be the nucleus from which is developed an adequate national department of health.

### WHEN DOCTORS DISAGREE

There are those who feel that the most important factor in the defeat of legisla-

tion providing for a national department of health with a Cabinet officer at its head was the division in the ranks of the medical profession.

A few months after President Wilson was inaugurated the writer urged him to make the establishment of a national department of health one of the first pieces of Democratic legislation. The President expressed himself as being in sympathy with any legislation for the protection of the health of the people of the United States, but said: "There seems to be a difference of opinion among medical men as to whether or not a department of health is needed." This incident is mentioned not to impugn the motives of any coterie of physicians, but to prove that there was in the ranks of the organized medical profession influential opposition to the creation of a department of health, even though the American Medical Association, and practically every other medical society, large and small, in the country had gone on record as favoring such legislation.

During the war we witnessed a shameful demonstration of a divided house, when the Owen bill that provided for increase in the rank of medical officers was delayed until its passage in an emasculated form came too late to correct the wrong that was done the patriotic medical men of the United States. It will be difficult to forget and to forgive the injustices and inequalities in rank among Medical Reserve Corps officers who made great sacrifices to serve their country; but who were discriminated against by a few small souls in the regular Medical Corps, largely as a result of blocking the passage of the Owen bill by influential medical officers in the Regular Army and a coterie of favored physicians from civil life. The JOURNAL has no grievance against the Army. The delay in legislation for increasing the rank of medical officers is mentioned only to point out that if the medical profession is divided in presenting to Congress the need for advanced legislation to protect the health and lives of the people of the United States, our efforts will avail but little.

Of course, all of us can not agree as to what is best, but it is important for the organized medical profession to agree upon the form of legislation desired to improve public health conditions in the United States and then present a united front to our national legislators. By united effort the medical profession can secure any kind of public health legislation; but if there is dissension in our ranks we are playing into the hands of our enemies.

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## A NEW BOOK ON SYPHILIS*

The C. V. Mosby Company, of St. Louis, has published a number of books by Southern authors; but it has published none of greater practical value to the general practitioner than Hazen's "Syphilis." This book also appeals to specialists in all lines of work, because some of the protean manifestations of syphilis are dealt with by every man who practices medicine.

Hazen's "Syphilis" meets a distinct need, since there is no other one volume that covers the entire subject of syphilis in a complete and authoritative manner. The author, in addition to his own contributions, has introduced various chapters written by experts in certain phases of the subject, making the text especially forceful and modern in every respect. With the astonishing facts that 10 % of all males in the United States are infected, this book should also appeal to the sanitarian and sociologist, because syphilis is responsible for a tremendous economic loss each year.

There is an excellent chapter written by

*"Syphilis," Henry H. Hazen, A.B., M.D., Professor of Dermatology and Syphilology, Medical Departments of Georgetown University and Howard University. Pages 647; 160 illustrations, including 16 figures in colors. St. Louis, Mo., 1919: C. V. Mosby Company.

Major Matthew A. Reasoner on "Experimental Syphilis, Infection and Immunity." The clinical course, with every known manifestation, is carefully written and profusely illustrated. After discussing the cutaneous lesions, chapters are devoted to each of the following: "Lesions of Nails and Hair"; "Affections of the Mouth and Throat"; "Affections of the Respiratory Tract"; "Syphilis of the Digestive Tract"; "Syphilis of the Vascular System." The chapter on "Syphilis of the Bones, Joints, Muscles, Tendons and Bursae" is written by Drs. John Dunlop and H. H. Hazen. Dr. H. A. Fowler contributed the chapter on "Syphilis of the Genito-Urinary Organs." Many illustrations, including x-ray cuts and cystoscopic views, add to the clearness of the text. The very excellent chapter on "Syphilis of the Nervous System," comprising about 65 pages, is written by Dr. John E. Lind. Dr. Louis E. Greene has contributed the "Syphilis of the Eye—Acquired Forms," and Dr. Virginius Dabney has written the chapter on "Syphilis of the Ear." "Congenital Syphilis" is discussed from the standpoint of every anatomical phase.

In the diagnosis of syphilis, Colonel Charles F. Craig presents a thorough discussion of the Wassermann reaction. This is followed by the prognosis, prophylactic and curative treatment. No disease requires proper treatment more than syphilis, and certainly this is one of the strongest points in the text. Altogether it is a very serviceable, complete and satisfactory book to have as a reference or guide in all questions pertaining to syphilis.

# Correspondence

## FOCAL INFECTIONS

SAN FRANCISCO, CALIF.
April 3rd, 1920.

Editor, SOUTHERN MEDICAL JOURNAL:

The editorials, "The Dentists and Focal Infections" and "Conservative Dentistry in Suspected Focal Infections" in the January and March numbers of the JOURNAL contain much that is sound and true. But it certainly is not true that "the average man believes that in order to get well of any disease from the tip of his toes to the top of his head all that he has to do is to go to a dentist and have his teeth extracted." And if it is true that "the doctor is being eliminated and some dentists are claiming to cure everything by pulling teeth," then some of the statements in these editorials deserve further discussion, for brief general statements are apt to mislead "those of both professions (doctors and dentists) who are not well-informed on the subject."

A very well-meant protest on account of its indefiniteness may be harmful. It may, for instance, lead to an attack on an excellent thing itself rather than an attack on the abuse of the excellent thing.

I feel called upon to speak at this time because the editorial on "Dentists and Focal Infections" would seem to the reader to bear directly on my article published in the SOUTHERN MEDICAL JOURNAL for September, 1919. And the discussion in the March number, particularly the quotation from Alvarez' protest against indisciriminate extraction, would seem to present a strong argument against my findings. I say would seem deliberately; and I should like to have the privilege of calling attention to the fact that the two articles named above do not really bear on the point of my paper.

The statement of Alvarez, "Day by day I see people who have had half a dozen or more teeth extracted. Their former physicians had promised them great things; in some cases had guaranteed a cure, but here they are still suffering and now greatly discouraged," is a statement which I myself can make most emphatically. No one could accord more heartily than I do with the statement that before any man should advise the extraction of teeth from x-ray findings he should have a thorough knowledge of the technic of radiography and a clear understanding of the pathology underlying focal infections. We certainly need the trenchant pens and the forceful oratory of a dozen Senns to halt the "furor" of extracting teeth.

The point I wish to make now is the point which I have been making time and again since 1915, i. e., that the vital question is not whether a tooth should be extracted or not.

When we read and write of extraction we are thinking of the old method of pulling a tooth, extraction with forceps followed by blind curetting or no curetting at all. Now in cases of severe focal infection, extraction followed by blind curetting is not sufficient to remove the source of evil. And in no case of focal infection is extraction followed by blind curetting sure to remove the source of evil. The source of evil is the focus of infection. Extraction, as is ordinarily practiced, leaves this source in the jaw. Blind curetting frequently serves to give a temporary relief, but fails to remove the focus thoroughly. Or the infection may be aggravated by poking and stirring with such serious result as death itself.

There is no real conflict in the seemingly conflicting views expressed in the following:

"Undoubtedly many persons have been relieved of infections that were responsible for arthritis, endocarditis, gastric and duodenal ulcers and many other diseases by removal of the primary dental foci of infections in the jaw; but there are many who have received no benefit from the removal of their teeth, and who will be handicapped in masticating their food for the rest of their lives."

In other words, many persons have been benefited by the removal of the focus of infection which was causing systemic ills. On the other hand, many persons have not been benefited by the removal of their teeth. There is a distinct difference between the removal of the focus of infection and the mere extraction of teeth.

Day by day I remove the foci of infection from the jaws of suffering and greatly discouraged persons who have had half a dozen or more teeth extracted; and day by day those persons cease to suffer and cease to be discouraged.

The arguments concerning focal infections and removal of teeth fail, in most cases, to take into account certain fundamental premises:

1. Every tooth from which the pulp has been removed or in which the pulp has died is in every sense of the word dead. A tooth receives no nourishment or life-sustaining substance except through the foramen or foramena.

2. Every dead tooth, within six months of the time of devitalization or death, is infected.

3. The infection spreads to the bone and the tissues surrounding the tooth root and commonly results in a focus of infection in the jaw.

4. Such a focal infection is a menace to health, even though no primary or secondary systemic symptoms are diagnosable, and as such should be removed.

5. A dead tooth and surrounding areas of infection can not be thoroughly removed by the old method of extraction.

6. The dead tooth and surrounding areas of infection can be removed safely and thoroughly by the operation which I have described in detail elsewhere. This operation permits the focus of infection to be removed under direct vision.

We need now something more than general statements concerning the abuse of the x-ray, the folly of regarding tooth-extraction as a panacea for all human ills, the need of co-operation between doctors and dentists, and the desirability of becoming thoroughly informed regarding focal infections. We need a more particular discussion of the six points enumerated above. They deal with matters of fact, which may be proved by experiment and observation. They have been established scientifically as truths. They have been accepted as true by many physicians and many dentists. (Particularly significant is the fact that many of my patients of late have been physicians and physicians' wives.) But many dentists still refuse to accept them and still seem to think that the matters of focal infection and tooth-removal may be decided without consideration of them.

One should welcome intelligent opposition tending to prove or disprove the premises from which a conclusion is drawn. But quite fruitless is the general discussion of conclusions without regard to the premises on which they are based. We can make no true progress until we answer the following questions: Is a devitalized tooth dead? Can a dead tooth remain uninfected in the jaw? Should an infected area be permitted to remain if it can be removed thoroughly and safely? Does ordinary extraction followed by blind curetting serve to remove a focal infection from the jaw? Does the operation which the writer advocates serve to remove a dead tooth and surrounding areas of infection thoroughly and safely?

Sincerely,
JOSEF NOVITZKY, D.D.S.

# Book Reviews

**Roentgen Interpretation, a Manual for Students and Practitioners.** By George W. Holmes, M.D., Roentgenologist to the Massachusetts General Hospital and Instructor in Roentgenology, Harvard Medical School; and Howard E. Ruggles, M.D., Roentgenologist to the University of California Hospital and Clinical Professor of Roentgenology, University of California Medical School. 211 pages, illustrated with 181 engravings. Philadelphia and New York: Lea & Febiger, 1919.

The practitioner rarely realizes the difficulty of interpretation of the x-ray plate, in which he is wont to place greatest confidence. The authors emphasize the difficulties, explaining the complexity of the shadows on each plate, the significance of delicate shadings, the intricate knowledge of anatomy and of roentgenology necessary, the sources of error, and the importance of several plates for a diagnosis. The body of the book consists of photographs and descriptions of abnormalities of different regions, ribs, spinal column, teeth, scapulae, gastrointestinal tract, genitounitary, etc., and the obstacles of interpretations in each. The chapter on lung fields is excellent, as are many others. There is a full bibliography at the end of each chapter. The book is of value to the physician and surgeon, as well as to the roentgenologist.

**Sex Attraction.** By Victor C. Vaughan, Sc.d., M.D., LL.D., Professor of Hygiene and Physiological Chemistry, and Dean of the University of Michigan, School of Medicine, Ann Arbor, Mich. 44 pages, paper cover. St. Louis: C. V. Mosby Co., 1920.

It is an admirably arranged and splendidly written brief address on sex problems which Dr. Vaughan delivered to public school teachers in Michigan and the Michigan State Normal School. His points are convincing by reason of their logic, which is tempered with much conservatism.

**Diseases of Nutrition and Infant Feeding.** By John Lovett Morse, A.M., M.D., Professor of Pediatrics, Harvard Medical School; Visiting Physician, Children's Hospital; Consulting Physician, Infants' Hospital and the Floating Hospital, Boston; and Fritz B. Talbot, A.B., M.D., Instructor in Pediatrics, Harvard Medical School; Chief of Children's Medical Department, Massachusetts General Hospital; Consulting Physician, Lying-In Hospital and Floating Hospital, Boston. Second Edition, Revised. 384 pages. New York: The Macmillan Co., 1920.

The second edition adds new data and brings the literature up to April, 1918, since which time the war has greatly limited research in pediatrics. The book reviews very successfully from a bio-chemical standpoint the work on the infantile digestive tract, analyses of breast milk and other natural milks and prepared foods. It discusses the symptomatology and treatment of common diseases of the gastro-intestinal canal and of nutrition. It gives information regarding early signs of digestive disturbances, appearance of normal stools, methods of determining which element in the food given disagrees with the baby, and the proper selection and preparation of artificial food. The mothers of today are frequently sufficiently educated to comprehend and profit by this. The sections on calcium metabolism, though brief, are good. The writers expound no set peculiar theory, in general. They review and logically arrange the facts which have been proven, and the hypotheses underlying the scientific work.

**Organization of Public Health Nursing.** By Annie M. Brainard. 144 pages. New York: The Macmillan Co., 1919.

A lay woman here deals with the arrangement and complicated organization necessary for the proper support and utility of one or more public health nurses. She shows how the nurse should set about to win the public interest in her work, and her attitude toward the committees and authorities over her, from whom she receives money or supplies. The information and point of view are a valuable addition to the series of books on public health nursing now under publication.

# Southern Medical News

## ALABAMA

Dr. Henry R. Carter, Jr., announces the opening of his offices in the Woodward Building, Birmingham. Practice limited to internal medicine. In this column in our May issue we were in error in announcing his practice limited to dermatology and syphilology. Dr. Carter is doing only internal medicine.

The Surgeons of the Alabama Power Company, at their recent meeting in Birmingham, elected Dr. C. L. Guice, Gadsden, President; Dr. J. F. Aiexander, Jasper, Vice-President; Dr. J. P. Stewart, Attalla, Secretary and Treasurer.

The Baptists of Alabama are soon to erect a large general hospital, and a number of Alabama cities are asking for it.

At the annual meeting of the Alabama State Medical Society, held in Anniston April 20-22, the following officers were elected: Dr. Louis W. Johnson, Tuskegee, President; Drs. Thomas J. Brothers, Anniston, and J. C. McLeod, Opp, Vice-Presidents; Drs. W. R. Jackson and Vivian Gaines, Mobile, and W. S. Britt, Eufaula, Censors. Montgomery was selected for the 1921 meeting place.

The University of Alabama is to establish a Department of Hygiene, in which the degree of Bachelor of Science in Hygiene will be given. A two-hour course will also be given to all students of the University during the freshman year. Dr. Hiram Byrd, a pioneer in rural school health work, now Director of the Department of Hygiene in the University of Mississippi, will be the head of this new department.

### Deaths

Dr. W. A. Elrod, Albertville, aged 50, died in General Hospital at Gadsden May 7, after a surgical operation.

Dr. W. A. Stallworth, Beatrice, aged 52, died April 3 from carcinoma of the throat.

Dr. John J. Patterson, Boaz, aged 74, died March 29 from cerebral hemorrhage.

Dr. J. W. Heacock, Talladega, aged 83, died April 27.

Dr. Joe McClendon, Dadeville, aged 52, died in Baltimore recently.

## ARKANSAS

At the recent meeting of the Board of Directors of the Jonesboro, Lake City and Eastern Railway Company, Dr. J. L. Burns was chosen Chief Surgeon to succeed Dr. C. M. Lutterloh, deceased.

The Board of Managers of the Helena Hospital, Helena, are planning to erect a building to cost $150,000. The present hospital building has been outgrown.

Several physicians of Poplar Bluff have organized a company and are planning to purchase the home of W. A. Greer for the organization of another hospital. The company will be capitalized at $50,000.

Dr. J. B. Dooley, Little Rock, has been appointed a member of the State Board of Examiners for Nurses to succeed Dr. M. D. Ogden.

The Greenwood District Medical Society was recently organized with Dr. G. G. Woods, President; Dr. B. L. Ware, Vice-President; Dr. C. W. Hall, Secretary-Treasurer.

Dr. O. L. Williamson, Marianna, has been appointed a member of the State Board of Health to serve the unexpired term of Dr. C. W. Lutterloh, Jonesboro, deceased.

Dr. F. A. Gray has been appointed a member of the Batesville City Board of Health.

### Deaths

Dr. Charles M. Lutterloh, Jonesboro, aged 57, died May 3 from heart disease.

Dr. J. W. Bush, Hot Springs, aged 51, died April 27.

Dr. Wm. H. Young, Springdale, aged 73, died April 7.

Dr. T. F. Bayliss, Little Rock, died recently from heart failure.

## DISTRICT OF COLUMBIA

The National Academy of Science held its annual meeting in Washington April 26. At this meeting plans were announced for the erection in Washington of a national headquarters to cost approximately $1,500,000. The building will be located in Potomac Park, near the Lincoln memorial. The fund was donated by the Carnegie Corporation of New York.

If the Howard University School of Medicine, Washington, succeeds in raising $250,000, the General Education Board promises to give them $250,000.

On May 6 the corner-stone of the new home of the Medical Society of the District of Columbia was laid. Addresses were made by several of the local physicians. The building will be ready for occupancy some time in November. It is located at 1716-1718 M Street, N. W.

Dr. Charles Wheatley, Lieutenant, M.C., U. S. Navy, married Miss May Frances Shane, both of Washington, April 5.

### Deaths

Dr. Frederick Sohon, Washington, aged 53, died May 7.

Dr. C. A. Kellam, Jr., aged 38, died in the Walter Reed General Hospital, Tacoma Park, April 5.

## FLORIDA

A modern building is to be erected in Jacksonville for the Florida Farm Colony for Epileptics and Feeble-minded.

### Deaths

Dr. Edward L. Miller, Mount Dora, aged 61, died April 23.

Dr. Esom G. Farris, St. Cloud, aged 77, died February 6 from influenza.

## GEORGIA

The following have been appointed members of the State Board of Health to succeed members whose terms expired May 7: Dr. L. A. Gardelle, First Ward; John Phinizy, Second Ward; A. B. Culpepper, Third Ward; R. H. Anderson, Fifth Ward; Dr. John C. Wright, Sixth Ward; Dr. H. W. Shaw, Chemist; Drs. E. E. Murphey and W. A. Mulherin, members at large. Dr. E. E. Murphey has retired as President of the Board. A new President will soon be appointed.

The Georgia Railway Surgeons' Association, composed of seventy-five members, met in Macon May 7 and perfected the organization which was partly organized in January. Dr. A. R. Rozar, Macon, was elected President; Dr. J. W. Palmer, Ailey, Secretary-Treasurer. Next meeting will be held in Atlanta in August.

The Georgia Hospital Association met in Macon May 4 and elected Dr. W. P. Worrill, of the University Hospital, Augusta, President; Miss Caroline Clark, Atlanta, Vice-President; L. C. Brown, Macon, Secretary and Treasurer. Macon was selected as a permanent meeting place.

### Deaths

Dr. John S. Holley, Macon, aged 63, died April 20 from nephritis.

Dr. W. J. Dismuke, Ocilla, aged 48, died May 13, following an operation for appendicitis.

Dr. L. J. Keeling, Atlanta, aged 27, was killed April 24 in a fall down an elevator shaft in his office building.

## KENTUCKY

A Kentucky Section of the Clinical Congress, American College of Surgeons, was established at a meeting in Louisville early in May. The meeting was called by Dr. Franklin H. Martin, General Secretary of the American College of Surgeons. It is planned to arrange at least one clinic a year to be conducted in Kentucky.

Physicians at Dawson Springs have announced an increase in their fees for professional services. The new fees range from a third to a half more than the old ones. Day calls in town now are $2.00, night calls $3.00, and calls in the country charged at the rate of $1.00 a mile for day calls with 50 per cent increase for night calls in the country.

The Rockefeller Institute will give Scott County $5,000 to maintain a full-time health unit, provided a similar sum is spent by the County.

Muhlenberg County has been awarded the Rockefeller Foundation fund for an all-time health service.

Officers elected for Ballard County Medical Society are: Dr. Ezra Titsworth, President; Dr. J. D. Rollings, Vice-President; Dr. Samuel R. Fairchild, Secretary-Treasurer.

Officers for Fleming County Medical Society are: Dr. J. B. O'Bannon, President; Dr. S. F. O'Brien, Vice-President; Dr. Charles W. Aitkin, Secretary-Treasurer.

Officers for Jessamine County Medical Society are: Dr. T.

(Continued on page 38)

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(Continued from page 468)

R. Welch, President; Dr T A Penic, Vice-President; Dr. J. A. Van Arsdall, Secretary-Treasurer.

New officers for Washington County Medical Society are: Dr. R. J. Hamilton, President; Dr. M. W. Hyatt, Vice-President; Dr. J. H. Hopper, Secretary-Treasurer.

New officers for Hopkins County Medical Society are: Dr. W. M. Hammock, President; Dr. C. R. Morton, Secretary-Treasurer.

New officers for Madison County Medical Society are: Dr. B. F. Robinson, President; Dr. J. H. Jeffries, Vice-President; Dr. J. G. Bosley, Secretary-Treasurer.

New officers for Garrard County Medical Society are: Dr. J. S. Gilbert, President; Dr. J. B. Kinnaird, Secretary.

New officers for Livingston County Medical Society are: Dr. W. F. Gardner, President; Dr. Vernon Matlock, Vice-President; Dr. Edward Davenport, Secretary.

New officers for Taylor County Medical Society are: Dr. E. L. Gowdy, President; Dr. J. L. Atkinson, Vice-President; Dr. C. V. Hiestand, Secretary-Treasurer.

New officers for Carter County Medical Society are: Dr. W. A. Horton, President; Dr. G. B. O'Roark, Secretary.

New officers for Perry County Medical Society are: Dr. A. M. Gross, President; Dr. Taylor Hurst, Vice-President; Dr. M. E. Combs, Secretary-Treasurer.

New officers for Lincoln County Medical Society are: Dr. W. T. Murphy, President; Dr. M. M. Phillips, Vice-President; Dr. L. J. Jones, Secretary-Treasurer.

New officers for Mercer County Medical Society are: Dr. Bishop Wash, President; Dr. C. P. Price, Vice-President; Dr. J. T. Price, Secretary-Treasurer.

New officers for Larue County Medical Society are: Dr. C. L. William, President; Dr. J. W. Wells, Vice-President; Dr. Leigh Maupin, Secretary-Treasurer.

New officers for Scott County Medical Society are: Dr. J. C. Thomasson, President; Dr. L. F. Heath, Vice-President; Dr. A. N. Crain, Secretary-Treasurer.

New officers for Laurel County Medical Society are: Dr. J. W. Crook, President; Dr. Oscar D. Brock, Secretary.

New officers for Monroe County Medical Society are: Dr. Jesse T. Smith, President; Dr. G. W. Bushong, Vice-President; Dr. R. F. Duncan, Secretary-Treasurer.

Summer courses for graduates in medicine will be given at the Louisville City Hospital from June 6 to October 1. About 300 physicians are expected to attend as students. Diseases of children, x-ray work, anesthetics, obstetrics, and courses in treatment of the eye, ear, nose and throat will be among subjects covered by the courses.

The Southwestern Kentucky Medical Association held its meeting in Paducah May 11. Drs. Herbert Bronner, A. O. Pfingst and J. J. Moran, of the University of Louisville staff, were made honorary members of the Association.

Dr. Calvin Caldwell, Louisville, who is to be the Scott County Physician employed by the State Board of Health and the Rockefeller Foundation, will succeed Dr. J. E. Pack, who resigned as City and County Health Officer.

Dr. F. C. Baird and Miss Vallerva Smith, both of Somerset, were married May 5.

**Deaths**

Dr. L. A. King, Henderson, died at the home of his daughter in Columbus, Ohio, May 8.

Dr. William Bright, Hickman, aged 73, died May 11 from heart disease.

## LOUISIANA

At the annual meeting of the Louisiana State Medical Association, held in New Orleans April 24-26, the following officers were elected: President, Dr. Homer Dupuy, New Orleans; Vice-Presidents, Drs. B. W. Smith, Franklin, William H. Harris, New Orleans, and Daniel O. Willis, Leesville; Secretary-Treasurer, Dr. P. T. Talbot, New Orleans.

The local order of Elks has bought the home of the Orleans Parish Medical Society, located on the corner of Elk Place and Gasquet Street. The Society needed larger quarters. It will be temporarily located in the Hutchinson Memorial Building, 1551 Canal Street.

Dr. Edmund Souchon, New Orleans, was awarded the gold medal for the best exhibit at the meeting of the A. M. A. in New Orleans. The exhibit was of anatomical specimens.

Dr. Urban Maes, New Orleans, was elected Secretary of the Section on Surgery of the American Medical Association, which met in New Orleans.

Plans for the new Presbyterian Hospital, New Orleans, have been completed and work will proceed rapidly on the erection of the building. The new hospital will be a ten-story structure.

Dr. G. B. Adams has purchased the interest of Dr. R. B. H. Gradwohl in the Adams-Gradwohl Biological Laboratories, New Orleans. On and after June 1 the Laboratories will be known as Dr. George B. Adams' Clinical Laboratory.

(Continued on page 40)


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(Continued from page 38)

and will occupy the same office space, 705-09 Maison Blanche Annex.

Dr. Elizabeth Bass, New Orleans, has been elected President of the Medical Women's National Association.

Dr. Erasmus D. Fenner married Mrs. Sadie Cameron McDonald, both of New Orleans, April 28.

**Deaths**

Dr. John Hamilton Ellis, State Registrar Vital Statistics, State Board of Health, died in New Orleans June 2 from uremic poisoning.

## MARYLAND

All the patients at the U. S. Army General Hospital No. 2, Fort McHenry, have been transferred to the Walter Reed General Hospital at Washington. The U. S. Public Health Service will take over the Fort for its war risk insurance work.

According to the will of the late Captain Joseph Raphael de Lamar, New York, he gives $5,541,401 to the Johns Hopkins University.

At the meeting of the Cecil County Medical Society Dr. Vernon H. McKnight, North East, was elected President; Dr. Howard Bratton, Elkton, Secretary-Treasurer.

At the meeting of the Medical and Chirurgical Faculty of Maryland, held in Baltimore May 11-13, the following officers were elected: Dr. W. S. Gardner, Baltimore, President; Drs. James H. Mason Knox, Jr., Baltimore, A. H. Hawkins, Cumberland, and Charles F. Davidson, Easton, Vice-Presidents; Dr. J. A. Chatard, Baltimore, Secretary; Dr. C. E. Brack, Jr., Baltimore, Treasurer.

The U. S. Public Health Service is conducting a survey and demonstration concerning the health of school children in Cecil County.

Dr. J. I. Wiseman, Baltimore, married Dr. Katherine Isabel Tate Slattery Fricka, Boston, April 24.

Of the legacy of $200,000 bequeathed the Johns Hopkins University by Eugene G. Mergenthaler to build a laboratory, a building devoted to the technical arts or a library building, the University has received securities and cash amounting to $186,444.

Dr. Henry M. Slade, Reisgerstown, has been reappointed Secretary to the Board of Health of Baltimore County.

**Deaths**

Dr. A. A. Hoehling, Chevy Chase, aged 81, died April 25 from arteriosclerosis.

## MISSISSIPPI

At the recent meeting of the Mississippi State Medical Association, held in Jackson, the following officers were elected: Dr. J. W. Barksdale, Winona, President; Drs. H. P. Kinney, Okolona, W. A. Johns, Corinth, and L. B. Hudson, Hattiesburg, Vice-Presidents; Dr. T. M. Dye, Clarksdale, Secretary (reelected); Dr. J. M. Buchanan, Meridian, Treasurer (re-elected).

The State Legislature has appropriated $250,000 for a new chemical building at the University of Mississippi which will provide laboratory and other facilities for students in the school. Funds were appropriated with which salaries of the teachers could be reasonably increased; also $10,000 was appropriated to secure permanent equipment for the medical school, exclusive of chemistry. The total appropriation exceeds $1,000,000.

The State Legislature passed a bill to appropriate $100,000 to establish a state school for the feeble-minded.

The Meridian Board of Trade has presented the city with the Matty Hersee Charity Hospital buildings, land and equipment. The Board secured this property by raising a public subscription fund from the city.

Dr. Hiram Byrd has resigned as Director of the Department of Hygiene of the University of Mississippi to accept the position of Director of the Department of Hygiene of the University of Alabama.

Dr. C. M. Shipp, Chief Sanitary Inspector for the Bureau of Health, recently reported better observance of sanitary regulations throughout the State and a growing evidence on the part of the public to demand cleanliness in the handling of food.

Dr. Marcus Beekman, Natchez, married Miss Lena M. Triche, of Newellton, La., at Natchez, March 27.

## MISSOURI

State Commissioners of Health held a meeting at Jefferson City April 6 and a permanent organization was formed under

(Continued on page 42)


# DR. WILLIAM KRAUSS'

## Physicians' Laboratory

DESOTO STATION, MEMPHIS, TENN.

Dr. Stingily's connection with my laboratory has terminated, he having resumed charge of the Mississippi State Laboratory, with enlarged facilities for carrying on this important work.

Requests for laboratory work of every description from the friends of the firm of KRAUSS & STINGILY will, as heretofore, be executed to the best of my ability.

Will gladly assist small private and hospital laboratories in solving their troubles.

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(Continued from page 40)

the name of the Missouri Health Officers' Association. The following officers were elected: Dr. G. C. Rogers, Clinton, President; Drs. Ulysses F. Kerr, Springfield, and Tolman W. Cotton, VanBuren, Vice-Presidents; Dr. G. H. Jones, Jefferson City, Secretary; Drs. J. W. Bruton, Ozark, Robert E. Crabtree, Butler, and William P. Smith, Troy, Directors.

Under the direction of the Missouri Association for Occupational Therapy a school for occupational therapy has been opened in the City Hospital at St. Louis. Miss Cora Ault is Superintendent of Occupational Therapy for the Hospital.

The Kansas City Library Club met April 12 and elected Drs. E. H. Skinner, Matthew W. Pickard and Logan Clendening, Directors for three years. At the meeting April 16 Dr. E. H. Skinner was elected President; Dr. M. W. Pickard, Vice-President; Dr. Harold P. Kuhn, Secretary-Treasurer.

At the meeting of the Southeastern Missouri Medical Association, held in Farmington recently, the following officers were elected: Dr. W. C. Patton, Cape Girardeau, President; Dr. J. A. Van Amburgh, Burfordville, Vice-President; Dr. E. J. Nienstedt, Blodgett, Recording Secretary; Dr. W. S. Hutton, Fornfelt, Corresponding Secretary; Dr. W. R. Goodykoontz, Caledonia, Treasurer.

At St. Joseph, under the charge of Dr. George R. Stevenson, a polyclinic is to be established at Community Hall.

Under the auspices of the University of Missouri School of Medicine and the State Board of Health, the week from June 14 to 19 has been designated as Public Health Week. This will be the first formal conference of health officers ever held in the State.

Dr. N. S. Moore, St. Louis, married Miss Helen Hereford, of Springfield, Ill., April 10.

**Deaths**

Dr. V. W. Mather, Kansas City, aged 73, died in the Robinson Sanitarium, Kansas City, April 18 from cerebral hemorrhage.

Dr. C. P. Glahn, Palmyra, aged 45, died April 28 from lethargic encephalitis.

Dr. W. J. Mairs, Newton, aged 65, died April 6 from carcinoma.

(Continued on page 44)

Laboratories of Drs. Bunce and Landham

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Director Pathological Dept.

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We perform these tests every day in the week except Sunday. Reports wired upon request.

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These pure ingredients are processed under a low enough temperature which does not kill the malt ferments. The action of these ferments upon the casein of the milk converts the proteins into partial peptones. The most delicate stomach can easily digest and assimilate Borden's Malted Milk.

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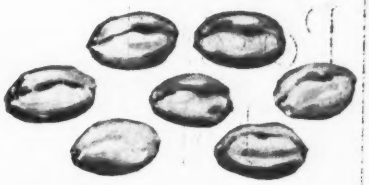

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**Puffed Rice**
**Corn Puffs**

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Dog heads for Negri bodies.

Autogenous vaccines put up in separate ampules.

I CAN ONLY HOPE TO GROW BY EFFICIENT SERVICE

## DR. J. S. FLEMING

**Exchange Bldg. Memphis, Tenn.**


(Continued from page 42)

Dr. H. A. McDonald, Prairie Home, aged 45, died at State Hospital No. 3, Nevada, April 18.

Dr. J. D. Smith, Nelson, aged 60, died April 14 from cerebral hemorrhage.

Dr. W. L. Griffin, Lamar, aged 82, died April 1 from paralysis.

Dr. J. F. Smith, Marshall, died recently from a stroke of paralysis.

### NORTH CAROLINA

At the annual meeting of the North Carolina State Medical Association, held in Charlotte April 20-22, the following officers were elected: Dr. T. E. Anderson, Statesville, President; Drs. Charles S. Lawrence, Winston-Salem, William H. Ward, Plymouth, and John M. Manning, Durham, Vice-Presidents; Dr. Benjamin K. Hays, Oxford, re-elected Secretary-Treasurer. Pinehurst was selected as the place for the 1921 meeting.

At the annual meeting of the North Carolina Health Association, held in Charlotte April 19, the following officers were elected: Dr. Romulus L. Carlton, Winston-Salem, President; Dr. L. J. Smith, Wilmington, Vice-President; Dr. George M. Cooper, Raleigh, Secretary-Treasurer.

Measles in a very severe form has broken out in and about Washington.

New members of the State Board of Medical Examiners are: Drs. Lester A. Crowell, Lincolnton; Lucius N. Glenn, Gastonia; J. G. Murphy, Wilmington; Clarence A. Shore, Raleigh; William M. Jones, Greensboro; William P. Holt, Duke, and K. P. B. Bonner, Morehead City.

The North Carolina Hospital Association recently met in Charlotte and elected the following officers: Dr. J. M. Parrott, Kingston, President; Drs. J. R. Alexander, Charlotte; Paul R. McFadyen, Concord, and Miss Gilbert Muse, High Point, Vice-Presidents; Dr. J. Q. Myers, Charlotte, Secretary-Treasurer.

Dr. Henry F. Starr, Greensboro, married Miss Virginia M. Goode, Boydton, Va., May 5.

### OKLAHOMA

The Oil Field Medical Association was recently organized in Oklahoma. Its membership includes all the active medical men of Cushing, Yale, Oilton, Quay, Shamrock, and Drumright. Officers were elected as follows: Dr. W. J. Neal, Drumright, President; Dr. J. W. Hough, Jr., Cushing, Secretary-Treasurer.

New officers for Quay County Medical Society are: Dr. J. C. Hawkins, Blackwell, President; Dr. W. A. T. Robertson, Ponca City, Vice-President.

A new fifty-bed hospital is being constructed at Cushing by the Southern Baptist Convention. This hospital will care for a large district in the oil field section of the State.

Dr. F. W. Ewing, Muskogee, has been appointed Superintendent of Health for Muskogee and Muskogee County.

At the second annual meeting of the Oklahoma State Hospital Association, held in Oklahoma City May 19, over thirty representatives of hospitals were present. The following officers were elected: Dr. Fred S. Clinton, Oklahoma Hos-

(Continued on page 46)

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**Electric Centrifuges**

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**1000 PRESCRIPTION BLANKS $2.00**
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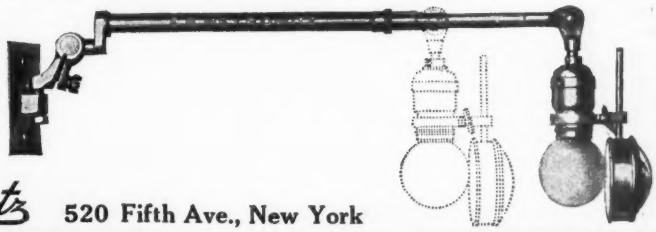

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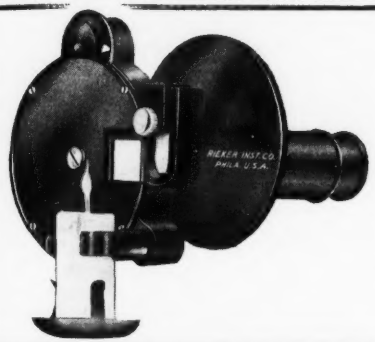


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APPLICATIONS are desired from physicians for desirable positions with a large corporation. Please state your age and college and the year graduated. Furnish small, inexpensive photograph if convenient. Applications will be considered strictly confidential. C. F. U., care JOURNAL.

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INTERNES WANTED—St. Joseph's Hospital (a three-hundred bed general hospital) needs two more internes, and would be glad to consider applications. Recent graduates preferred; state school graduated from and year of graduation. Compensation, board and lodging, and instruction. Term of service, one year. Apply to Dr. O. S. McCown, Bank of Commerce & Trust Building, Memphis, Tenn., President of Staff.


(Continued from page 44)

pital, Tulsa, President; Dr. J. A. Hatchett, El Reno Sanitarium, El Reno, First Vice-President; Dr. A. J. Risser, Blackwell Hospital, Blackwell, Second Vice-President; Dr. Paul H. Fesler, Superintendent University Hospital, Oklahoma City, Executive Secretary; Dr. J. H. White, Baptist Hospital, Muskogee, Treasurer; Dr. C. L. Reeder, Tulsa Hospital, Tulsa, Delegate to American Hospital Association; Dr. G. A. Boyle, Enid General Hospital, Enid, Alternate.

**Deaths**

Dr. C. W. J. Specht, Fairview, aged 66, died in St. Louis April 6 from pneumonia.

### SOUTH CAROLINA

Railroads in the State are co-operating with the State Tuberculosis Association in a warfare against spitting in railroad cars, the aim being to stop the spread of disease. Spitting in stations and on platforms is also being fought.

At the annual meeting of the South Carolina State Medical Association, held in Greenville, the following officers were elected: Dr. W. J. Timmerman, Batesburg, President; Drs. J. Miles Walker, York, William A. Boyd, Columbia, and William W. Fennell, Rock Hill, Vice-Presidents; Dr. E. A. Hines, Seneca, re-elected Secretary-Treasurer.

Dr. Walter H. Harper, Spartanburg, married Miss Marie Christena Peterson, of Rodney, Mich., April 22.

### TENNESSEE

As a memorial to his mother, a $50,000 hospital is to be erected in Alamo by Edgar Johnson.

The Phillips home in Pulaski has been secured by the King's Daughters for a public hospital. Mrs. C. C. Brown is President of the King's Daughters.

Plans for the purchase of 100 acres of land near Memphis on which will be erected a national Masonic hospital, at a cost of several hundred thousand dollars, are being considered.

Drs. O. Dulaney and J. D. Brewer, Dyersburg, announce their association. Practice limited to eye, ear, nose and throat.

(Continued on page 48)


# PATHOLOGICAL DEPARTMENT

OF THE

# SOUTH HIGHLANDS INFIRMARY

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Pathological, Bacteriological, Serological and Chemical Examinations

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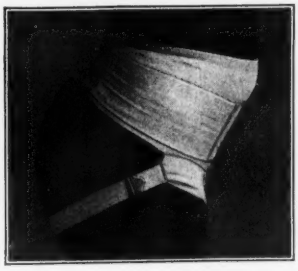

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The vial is amply strong which prevents breakage so frequent with shell vials.

We are exclusive and pioneer producers of Bacterial Vaccines. Originators of the asceptic bulk package. Pioneer in elucidation, experimentation and clinical demonstration.

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# Acriflavine GH

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which are diamino acridinium salts suitable for use by local application, intramuscular, intravenous or urethral injection in Suppurating Wounds, Septic Infection, Acute or Chronic Urethritis. Do not precipitate albumen. Potency **increased** in presence of blood serum. Promptly diffusible. Do not inhibit phagocytosis.

Non-irritating.

**ACRIFLAVINE GH** and **PROFLAVINE GH** are far less irritant and toxic than the acridinium derivatives used abroad or formerly sold in this country. **Acriflavine** and **Proflavine** have been accepted by the Council on Pharmacy and Chemistry of the A. M. A. for inclusion in New and Non-Official Remedies.

**Send for Literature, Price Lists, etc.**

## Heyl Laboratories, Inc.

**437 BARRETTO STREET, NEW YORK**


(Continued from page 46)

More than fifty orthopedic surgeons from the Middle West and East met in Memphis April 26 as the guests of Dr. Willis C. Campbell. The visit of the surgeons was in line with their annual custom of attending clinics in the various cities represented in order that they may be acquainted with the work being done.

Shelby County has started a $15,000 fight against the mosquito. Every pool and pond will be oiled and the premises will be cleaned up.

A committee representing the American College of Surgeons met in Memphis May 4 for the purpose of organizing a section of the College for Tennessee. The section will be composed of representatives from each congressional district.

Miss M. G. Nisbet, who has been with Field Unit No. 6, Division of Rural Sanitation of the State Board of Health, has been selected as Supervising Nurse for the four units.

Dr. Stanton H. Barrett recently resigned his position as City Director of Health, Chattanooga, and will go to Harvard Medical School for a special course in the treatment of children's diseases. No successor will be appointed to fill this vacancy.

### Deaths

Dr. John Franklin Hicks, Bristol, died recently.

Dr. Alfred Jones, Cornersville, aged 81, died April 16.

Dr. Henry T. Drane, Clarksville, aged 70, died at the home of his daughter in Brookhaven, Miss., March 24 from pneumonia.

Dr. B. L. Branch, Collierville, aged 63, died April 25.

Dr. DeWitt C. Joyner, Memphis, aged 83, died May 5.

Mr. W. H. Haywood, Memphis, aged 51, died May 7 at Touro Infirmary, New Orleans, following an operation for duodenal ulcer. Mr. Haywood represented the J. A. Majors Company in Memphis, New Orleans, Nashville, Louisville, South Carolina and Florida. Prior to his present connection he was for a number of years Editor of the News-Scimitar, Memphis.

### TEXAS

At the annual meeting of the Texas State Medical Association, held in Houston in April, the following officers were

(Continued on page 50)


# DR. GEORGE B. ADAMS'
# Clinical Laboratory
## NEW ORLEANS

Dr. George B. Adams begs to announce that he has purchased Dr. R. B. H. Gradwohl's interest in the Adams-Gradwohl Biological Laboratories. In the future the laboratory will be known as Dr. George B. Adams' Clinical Laboratory, and will occupy the same office space 705-09 Maison Blanche Annex.

Dr. R. H. B. Gradwohl in surrendering his interests, begs to thank the profession for their generous support of the Laboratories, and hopes they will continue their patronage as before.

**ANTI RABIC VIRUS---Full Course Treatment - - - - $25.00**

As improved and made under the personal supervision of Dr. D. L. Harris. (U. S. Government License No. 66.) YOU GIVE THE TREATMENT YOURSELF. Sole Distributors. Telegraph orders given prompt attention. Write for Booklet.

**WASSERMANN TEST (Blood or Spinal Fluid) - - - - - $5.00**

We do the classical test. Any of the various modifications will be made upon request, without additional charge.
Sterile containers, with needle, gratis upon request.

**EXAMINATION OF PATHOLOGICAL TISSUE - - - $5.00**

Accurate histological descriptions and diagnoses of tissues removed at operation should be part of the clinical record of all patients.

**Sterile containers for the collection of all specimens sent gratis upon request.**
**Routine laboratory examinations made at reasonable prices. Send for fee list.**

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*ST. LOUIS* University Club Bldg.
*NEW YORK* 18 East 41st Street
*BROOKLYN* Chamber of Commerce Building
*DETROIT:* Smith Building

**Medication for Hypodermic Treatment**

**Sterile, Accurate, Efficient. In Hypule Form**

**Sodium Cacodylate, Mercury Biniodide, Mercury Salicylate, Iron Citrate, Iron Citrate and Sodium Arsenate, Emetine Hydrochloride, Fisher's Solution (concentrated), Gray Oil, Novocain and 80 other formulae.**

These hypules not only insure full potency and exact dosage of he drug to be administered, but they afford the physician an aseptic, and readily assimilated solution or suspension. For treatment in serious and malignant diseases, hypodermic medication is far superior to the indirect methods of absorption through the alimentary tract. The use of **HEISTER'S HYPULES** places this form of medication on a scientific basis, relieving the practitioner of all anxiety as to the quantity or character of the hypodermic injection which he administers.

**From the Laboratory of**

**LOUIS HEISTER**

**Manufacturers of Physician's Pharmaceutical Specialties in Hypule Form**

**List on Application CINCINNATI, OHIO, U. S. A.**

*"Electro-Therapy in the Abstract"*

The chapter on "Diseases" is prefaced with the following "Note":

"The method of treatment given in the following pages has been founded on personal observations of a great many practitioners, authorities on the subject, both in this country and in Europe, who unanimously report the cures resulting from its application.

"Books, periodicals and papers which have been read before medical societies, etc., have been used for reference, but to enumerate all the pages from which facts have been gleaned for corroborative testimony concerning the method of treatment is impossible."

An encyclopedic work in short, boiled down to the last essentials, bound to stand wear, and pocket size for immediate and constant reference.

Distributed, without charge, and with our compliments, to physicians and surgeons who ask for it. Kindly use letter head.

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Our Record: Not a single failure. Not a single infection from an injection.

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Eddy Bldg., Bloomington, Ill.

(Continued from page 48)

elected: Dr. I. C. Chase, President; Dr. D. J. Bennett, Austin, President-elect; Dr. W. S. Miller, Estelline, Dr. W. J. Pollard, Kaufman, and Dr. Walter Shropshire, Yoakum, Vice-Presidents; Dr. Holman Taylor, Secretary. Dallas was selected for the next meeting place.

Dr. J. C. McReynolds, Dallas, was elected Vice-President of the Air Service Medical Association at a meeting held in New Orleans April 28.

A fight on malaria has been started in certain portions of the State. Dallas is preparing to spend $6,000 in cleaning out streams, draining pools and in other anti-malaria work.

Texas Fellows of the American College of Surgeons held a meeting in San Antonio March 18 for the purpose of forming a section of the College for Texas.

A campaign has been launched to raise $100,000 for the purpose of rebuilding the Spohn Sanitarium, Home and Hospital of the Sisters of the Incarnate Word, Corpus Christi, which was destroyed by the hurricane of last September. Mrs. H. M. King, Kingsville, has given a five-acre tract of land as a site and the Red Cross has made a gift of $2,500 for the new building.

At a recent meeting of the Upshur County Medical Society officers were elected as follows: Dr. J. G. Eastham, Pritchett, President; Dr. H. J. Childress, Gilmer, Secretary.

New officers for the Panhandle District Medical Society are: Dr. H. L. Wilder, Clarendon, President; Dr. G. B. Lee, Wichita Falls, Second Vice-President; Dr. J. J. Crume, Amarillo, re-elected Secretary.

New officers for Denton County Medical Society are: Dr. T. M. Harris, Pilot Point, President; Dr. J. E. Stover, Denton, Vice-President; Dr. H. G. Fleming, Denton, Secretary-Treasurer.

New officers for Jasper-Newton County Medical Society are: Dr. B. A. Swinney, Newton, President; Dr. J. P. Masterson, Bessmay, Vice-President; Dr. W. F. McCreight, Kirbyville, Secretary-Treasurer.

New officers for Burleson County Medical Society are: Dr. G. C. McLeod, Lyons, President; Dr. B. O. McLean, Caldwell, Secretary.

At a recent meeting of the Bexar County Medical Society Auxiliary the following officers were elected: Mrs. Frank Paschal, President; Mrs. Jack Watts, First Vice-President; Mrs. W. H. Hargis, Second Vice-President; Mrs. Everett

(Continued on page 52)

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(Continued from page 50)

DePew, Third Vice-President; Mrs. R. L. Dinwiddie, Secretary; Mrs. P. R. Nixon, Treasurer; Mrs. Amos Graves, Parliamentarian; Mrs. Harry Leap, Mrs. W. H. Hargis, Mrs. Warren, Mrs. Con L. Milburn, Mrs. J. A. McIntosh, Mrs. J. P. Oldham, Mrs. J. T. Lowry, Mrs. W. A. King, Mrs. E. O. Evans, Mrs. E. A. Chatten, Mrs. B. F. Stout and Mrs. Ella Russ, Advisory Board.

Dr. Walter L. Drewry married Miss Esse C. Morris, both of El Paso, April 18.

**Deaths**

Dr. R. F. Harnesberger, Beckville, aged 62, died April 19.

Dr. Joseph H. Hooper, Dallas, aged 79, died in Thorp Springs March 28 from senility.

Dr. Robert Emerson, El Paso, aged 63, died February 23 from senile gangrene.

## VIRGINIA

At a cost of $28,000, the Trustees of the Virginia Baptist Hospital Association have purchased a site near Lynchburg upon which to build their proposed hospital. Work on the hospital will begin early next year.

At a recent meeting of the Northampton County Medical Society the following officers were re-elected: Dr. W. J. Sturgis, Franktown, President; Dr. B. H. Gilmer, Cape Charles, Vice-President; Dr. Holland Trower, Eastville, Secretary-Treasurer.

New officers for the Rockingham County Medical Society are: Dr. J. E. Lincoln, Lacey Spring, President; Dr. A. C. Byers, Harrisonburg, re-elected Secretary-Treasurer; Dr. G. V. Wood, Jr., Harrisonburg, Corresponding Secretary.

Dr. James Allan Bennett, Harmony Village, and Miss Grace Bloomwood Vaden, Middlesex County, were married April 27.

**Deaths**

Dr. Wm. B. Fellers, Roanoke, aged 35, died April 23 from carcinoma of the kidney.

Dr. R. F. Cox, Alexandria, aged 29, died at the home of his parents April 19 from tuberculosis following influenza.

Dr. James G. Boxley, Louisa, aged 77, died April 23.

Dr. F. C. A. Kellum, Major, M.C., U. S. Army, Pungoteague, aged 38, died in Washington April 11 after undergoing an operation.

## WEST VIRGINIA

At the meeting of the West Virginia State Medical Association, held in Parkersburg May 18-20, the following officers were elected: Dr. J. Howard Anderson, Marytown, President; Dr. H. E. Gaynor, Parkersburg, First Vice-President; Dr. S. G. Moore, Elkins, Second Vice-President; Dr. Charles O'Grady, Charleston, Third Vice-President; Dr. Robert A. Ashworth, Moundsville, Secretary; Dr. H. G. Nicholson, Charleston, Treasurer. Next meeting place, Pence Springs.

Dr. F. L. Hupp, Wheeling, has been made Chairman of the State Cancer Committee.

**Deaths**

Dr. W. A. Barnes, Martinsburg, aged 54, died May 1 from pernicious anemia.

Dr. W. J. Trask, Great Cacapon, aged 62, died the latter part of April.


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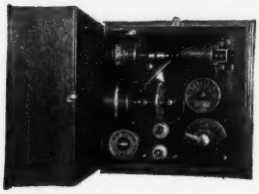

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